Science & Mechanics

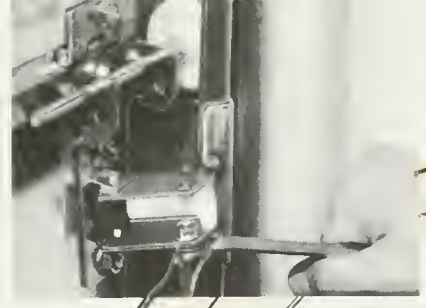
Complete HANDYMAN ENCYCLOPEDIA

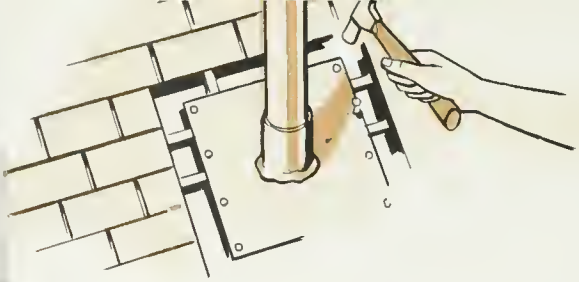
8

FIRST AID
GARAGE REMODELING

do-it-yourself

Complete
Handyman
do-it-yourself
Encyclopedia





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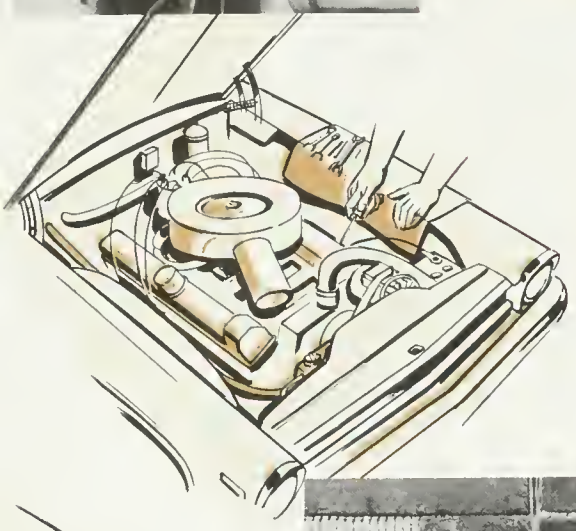

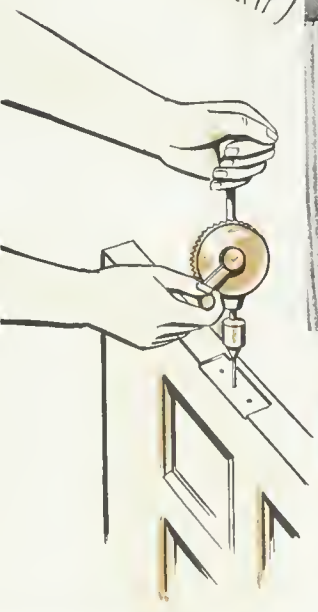

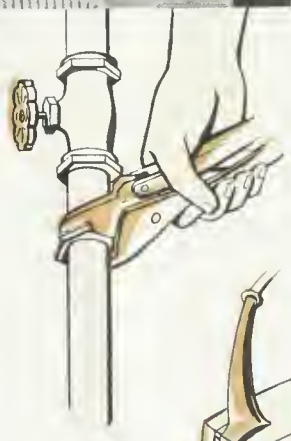

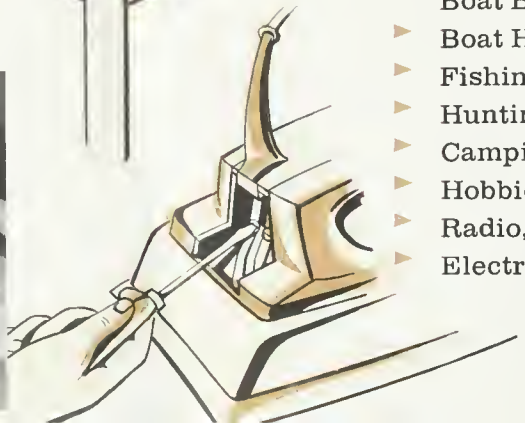

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Complete Handyman yourself Encyclopedia

A COMPILATION OF SPECIAL INTEREST PROJECTS AND MANUALS FOR THE REPAIR AND CARE OF HOMES, AUTOS, APPLIANCES, HOBBY EQUIPMENT.

by the editors of

Science & Mechanics

8

FIRST AID
GARAGE REMODELING

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First Aid and Medicine for Campers

**What to do–or not do–
when there is no physician
nearby. Two tips:
Be prepared and consult your
doctor when you stock your first
aid kit**

MANY OF US HAVE HAD at least an elementary course in first aid. We've learned about the treatment of fractures, how to stop bleeding by the application of pressure to designated pressure points, how to give mouth-to-mouth resuscitation and other artificial breathing methods. In short, we've learned a great deal about how and what to do until the doctor comes.

But suppose the doctor isn't coming? Suppose you are off in some remote area alone, or with a companion or two, when an accident or illness suddenly strikes? You may be miles, even days, away from professional medical help. What then? Your first aid training plus a little medical knowledge may mean the difference between life and death. At the very least, your knowledge can prevent a great deal of suffering or discomfort.

Outdoorsmen should not regularly rely on self-treatment, but certainly anyone who spends much time away from home, often in rather isolated places, should know at least certain preventive measures and remedies as well as basic first aid.

Such treatment should be undertaken only when the services of a physician are not available. Even then, doctors warn, many ailments are better left untreated than maltreated.

Some medications are obtainable only on a doctor's prescription. Therefore a conference with your own family physician is the first step in your own medical self-help program. Your doctor knows the history of your own illnesses and disorders and those of your family. Some of the drugs mentioned here may be contraindicted where a history of hypertension, cardio-vascular disease, allergies and hypersensitivity to certain antibiotic drugs, or other conditions may exist.

For these reasons also, doctors caution,

fish identity: see fishing

the lay person should be extremely aware of the dangers of administering drugs, or taking them himself, except in cases of emergency.

Scare stories about the dangers in the out-of-doors notwithstanding, outdoor activities are usually far safer than staying at home, crossing a street, or eating a meal in the local "greasy spoon." Relatively few outdoor people are devoured by grizzly bears, ambushed by snakes or done in by falling off mountains. But even the simplest of accidents or illnesses can be uncomfortable, even dangerous, if not attended to within a short time.

A blister on a foot, caused by improper footwear, may become dangerously infected. A minor sprain may prevent your reaching camp before a freezing night closes in. Spoiled food may lay you low with dysentery. A common cold may lower your resistance to more virulent viruses, such as influenza or pneumonia. Any one of many mishaps, trivial if they had occurred at home, can utterly ruin a camping trip for you and your companions.

Your family doctor can help you assemble a comprehensive kit.

In a plastic envelope, inside the kit, keep a copy of the American Red Cross First Aid Manual. In another envelope have a list of symptoms and injuries together with the suggested treatment. Discuss these with your own physician and assemble your own, personal kit.

Your doctor will caution you never to drive a vehicle while taking certain medications; antihistamines, paregoric and sulfa drugs among them. Heed this advice. It is better to suffer a little than not to be able to.

The adage about "an ounce of prevention" was never truer than when it is applied to outdoor mishaps and illness. Any prevented accident or illness does not have to be treated.

Be sure of your water supply, particularly in foreign countries. Questionable water may easily be treated by chlorination (Clorox) and filtration to make it safe. One teaspoon of Clorox will treat five gallons of water. Mix and let stand for five minutes before drinking.

Properly fitted footwear, worn with two pairs of socks, will prevent the discomfort and danger of blisters.

Careful observation of the plants around a campsite or hiking trail may prevent inadvertent exposure to noxious weeds such as poison ivy, oak, and sumac.

Be alert for snakes and spiders, particularly around brush and rock piles, old lumber piles and disused buildings.

Watch where you walk at all times. A careful tread can prevent slips, sprains or fractures.

Be careful with fire and when working around your cooking stove. Burns from grease spills and spatters are no fun at home, or in camp.

Discuss your immunization program with your physician. Tetanus toxoid, polio, and typhoid are particularly recommended for the traveling outdoorsman. Perhaps you will need only booster shots. By all means get them.

Do you have regular dental checkups. Additional ones may be needed prior to outings if loose fillings or sensitive areas develop.

Chronic pre-existing ailments should be discussed with your doctor. Diabetics, persons with heart conditions or allergies may have specific medications indicated, or contraindicated, for them. It is wise to carry a special, emergency supply of regularly used medications.

Never eat food that has been stored under suspicious conditions. Foods in rusted or swollen cans should be immediately discarded. Meat, fish, or potato salads should never be stored or used within more than one hour after mixing. Make it a practice never to order such foods in roadside restaurants. Food poisoning, dys-

entery, or even the deadly botulism are the price of carelessness.

Do carry a card or bracelet showing your blood type and Rh factor, your allergies, sensitivities to specific drugs, pre-existing ailments such as diabetes or heart condition, and current immunizations.

Don't over-exert. Don't try to keep up the pace that others, in better condition, may try to set for you. Take it easy and join the group later. If this is not practical, then don't make that particular trip or hike.

Finally, keep yourself in the best possible physical condition. Regular exercises in the form of walking, mild calistenics, and moderately strenuous games do much to maintain muscle tone and lung capacity. It is wise to consult with your physician before starting a program particularly if you are past middle age or have led a previously sedentary life.

But above all, don't be apprehensive about outdoor dangers. Actually, you are far safer than you would be at home. The most dangerous part of any wilderness outing is getting there on the highways.

A little caution and a little common sense will help to make your trip a carefree and enjoyable one. You may never have to open your emergency kit in the years ahead.

It's insurance, that's all. J.R.

See also: CAMPING; HIKING.

SUGGESTED EMERGENCY TREATMENTS

Abrasions and brush burns. Scrub with Phisohex, cover with soft dressing and bandage.

Animal bites. Treat as cuts and wounds. Suspect rabies! If wild animal, particularly fox, skunk or feral dog or cat, get patient to doctor as quickly as possible. Many wild animals are infected with rabies. If tame domestic dog or cat, ascertain if animal has had rabies inoculations.

Back Sprain. Place patient flat on back, on board or other firm support. Immobilize and transport to physician.

Blisters. See foot blisters.

Bruises. Apply ice packs for first 12 to 24 hours to reduce swelling, then hot packs or soaks, next 24 hours.

Brush burns. See abrasions.

Burns. Wash gently with cold water. Do not apply grease or oil, or bandages. Keep dry.

Colds. Light diet. Force fluids. Encourage intestinal regularity. Five grains of aspirin every four hours. Nasal decongestants.

Complicated respiratory infections. Symptomatic treatment as for colds plus use of antibiotics prescribed: Acromycin, Declomycin, Terramycin and other broad spectrum types orally administered.

Constipation. Some irregularity is to be expected in some individuals when a change of environment is encountered. It may correct itself in a day or two. Use milk of magnesia as directed on bottle, or glycerin suppositories. If accompanied by severe abdominal pain, suspect appendicitis, see a doctor.

Cuts. See minor cuts.

Diarrhea, (dysentery). Paregoric, 1 teaspoonful (adult) after each bowel movement. Child: ½ teaspoonful every three to four hours. Infant: 12 to 16 drops, three to four hours. Follow low residue diet for several days. If dysentery is suspected, see a doctor. Meanwhile, keep patient quiet, feed only bland diet with plenty of liquids.

Earache. Infuse a few drops of alcohol, or a saturated solution of boric acid in grain alcohol, into the affected ear. If alcohol is not available, use slightly warm salt water.

Eye injuries. Rinse with clear water if a

foreign object is in eye. Treat with mercuric oxide or boric acid ointment. If wound or foreign body, tape a soft pad firmly in place to immobilize lid. Administer aspirin, codein or Demerol for pain.

Foot blisters. Clean with Phisohex, and dress to relieve pressure. If blister is very large and uncomfortable, and if patient must continue walking, carefully puncture blister with sterile instrument, drain, wash with Phisohex, dress with soft pad and bandage. Use a good foot powder to prevent blisters.

Headaches. For simple headaches, take aspirin, Bufferin, etc. For severe headaches, take Darvon, Demerol. Severe headaches are often symptomatic of a dangerous illness. Get patient to physician if pain persists more than 24 hours.

Insect stings. Honeybee workers sting once, then leave their stingers. Remove stinger carefully with tweezers or knife blade to prevent squeezing poison sac. Otherwise, treat as follows for stings of hornets, wasps, etc. Suck gently to remove venom, immerse affected part in mixture of ice and water, or use ice pack. If pain persists, or with swelling, treat with paste of ordinary baking soda or Cortisone ointment. Administer antihistamine (Benadryl capsules or elixir, or Chlortrimeton as for poison plants).

More severe cases often respond to steroids, such as Cortisone, Decadron. Persons of known sensitivity to stings may be desensitized, prior to exposure, by physician.

Minor cuts. Scrub with Phisohex, leaving a residue. Bandage.

Motion sickness, nausea, vomiting. Pepto-Bismol, milk of magnesia, or other antacid; over ice, frequently, for minor stomach upsets. Dramamine or Bonine, as directed on package, for prevention of motion sickness.

Nausea. See motion sickness.

Poison plants. For contact with plants such as poison oak, ivy and sumac, scrub with Phisohex or strong laundry soap. Flush well to remove plant oils. Treat with calamine lotion, Caladryl or topical anesthetic such as Americaine. Administer antihistamine (Benadryl: 25-50 mg, capsules for adults, elixir for infants). Some physicians recommend use of steroids, such as Cortisone. When contact is known to have occurred, wash immediately to prevent infection.

Poison plants, internal. Milk of magnesia and water (1:4) as rinse for painful mouth irritation. Milk of magnesia, two to four tablespoons, to eliminate poison from body.

Puncture wounds. Superficial cleansing with Phisohex, or other soap. Apply antibiotic ointment. Hot soaks for two days. For through-wounds, such as fish hooks, push hook through wound after first coating with Phisohex or other antiseptic, then follow procedure above.

Respiratory infections. See colds or complicated respiratory infections.

Severe wounds. Note bleeding. Scrub with Phisohex, wiping off residue around lips of wound. Pull lips of wound together and secure with butterfly bandages. If butterfly bandages are not available, cut narrow wasp-waisted strips of adhesive tape and apply directly to closed wound.

Very severe bleeding may often be checked by use of pressure directly over wound. Use a cloth or foam pad or sponge under pressure point to prevent bruising and to distribute pressure more effectively.

A tourniquet should be used only as a last resort. Apply as directed in First Aid Manual and loosen every 15 minutes. Discontinue as soon as bleeding stops.

Sprains. Ice packs first 12 to 24 hours, then hot packs or soaks. Elevate member to reduce circulation. Wrap with Ace bandage or support temporarily with

tightly applied triangular bandage made from any available fabric.

Stings. See insect stings.

Toothache. Apply oil of cloves directly to painful area. A toothache wax compound may help to replace a lost filling where cavity is air-sensitive. Aspirin, one-half grain codein, Darvon or Demerol compound may help as pain reliever.

Vomiting. See motion sickness.

Wounds. See puncture wounds or severe wounds.

FIRST AID KIT

Over-the-Counter Items
Adhesive tape, surgical, 1/2″ and 1″.
Assorted adhesive dressings such as Band-Aids or Curads.
Butterfly bandages, 1 dozen each, small and large size. Your doctor or surgeon can get these for you, or order through your pharmacist. Properly called "butterfly closure."
Sterile dressings, 2″ and 4″ square.
Triangular bandage.
Ace elastic bandages, 2″ and 3″ width, for sprains.
Pepto-Bismol for diarrhea and nausea.
Milk of magnesia, an antacid and laxative. Also for nausea, upset stomach, constipation.
Topical anesthetic ointment for relief of surface pain or itching due to non-poisonous insect bites, minor burns and wounds.
Triple antibiotic ointment to prevent infection in minor cuts, burns, abrasions.
Foot powder to treat or prevent blisters and for other chafing.
Boric acid ointment for minor eye irritation and injuries.
Mercuric oxide ointment for eye irritations, particularly styles.
Snake bite kit (Cutter Laboratories).
Cotton (absorbent), for swabs, pads, applicators.
Petroleum jelly for brush burns, wounds.
Aspirin or similar compound for use as a general pain reliever.
Nasal decongestant, for symptomatic treatment of colds and minor sinusitis.
Furacin antiseptic powder for foot blisters.
Alcohol-boric acid solution for treatment of earache and ear infections. Use several drops of the solution in the affected ear.
Ammonia inhalers, for treatment of fainting.
Scissors, razor blades, large needles.
Prescription-Only Items (Consult your family physician for recommendations.)
Paregoric for diarrhea and dysentery symptoms.
Anti-Sting Kit (Center Laboratories). A new prescription item which should be particularly useful for persons with high sensitivity to insect stings. Discuss with your physician.
Steroid, such as Cortisone or Decadron. Very effective against insect stings and poisonous plants.
Codeine or Darvon compound for treatment of coughs due to colds and as general pain reliever for headaches, toothaches, sprains, etc.
Antibiotic tablets as prescribed by physician for treatment of respiratory infections, viruses. However, self-treatment with these drugs can be extremely dangerous and your physician may or may not rely on your judgment to use them properly.

Where to Learn Fly Casting

Several schools teach this skill to both novices and experienced anglers

THERE ARE NOW SCHOOLS to teach fly fishing, which includes casting, "reading" water, knot tying and hatch matching.

Classes are held at about fifteen locations from March through September, in sessions of two to five days, some with actual fishing. Almost anyone—beginners, journeymen, families—can benefit. One such school is the Fenwick Fly Fishing School.

At an opening session at Fenwick, only a couple of students are proficient. The man single-hauling smoothly is swooping the schools; first Orvis in Vermont, now here, later Fenwick's postgraduate backcountry course. The best caster is already shooting off 70-footers.

Others, with varying fishing experience, are fighting old habits. An instructor says it is harder to break these than to start cold. The chronic mistakes lie in swiping too far forward or back, and punching the strokes rather than accelerating smoothly.

fishing, bass: see bass fishing
fishing knots: see knots
fishing lures: see lures
fishing skiff: see skiff, hunting and fishing

There was issued in class an exhortative pronunciamento: "If you can't cast well, it's because you choose not to."

In the classroom an instructor gives a slide talk. Somehow his presentation seems designed for you, whatever your expertise. There are the basics on line weights and tapers, but the esoterica, too: For extreme accuracy, (though not delicacy), he advises, snip off the line point two or three inches ahead of the taper . . . For better control, lay the thumb along the top of the rod grip . . . Sink your dry-fly leaders—forget the old texts . . . Don't delay the forward cast until the line tugs . . . An electroshock study found all the big browns in the Madison River within three feet of the bank . . . Cast well upstream of rises because a trout drops below its lie to take . . . Lubricate a blood knot with your tongue before the final tightening.

There is more. Another instructor appears with a vest full of equipment: flies in compartmented boxes, tipped material of various diameters, bottled fly dressing, surgical hemostat (to unhook fish), sunglasses and hat (for protection from wayward casts), safety pin (to pick wind knots from leaders). Then he portrays a succulent stonefly, arms flapping like wings; to make an artificial fly flutter similarly is a pinnacle of technique.

The actual fishing is the school's final lesson, not its denouement. This should be understood. Nothing can be finally resolved which depends on fish, hatches and weather, all unpredictable. The river twists along a sagebrush flat, water knee-deep and mossy, with brown trout and a few rainbows. The group—a dozen students, plus instructors —deploys along a half mile and begins rigging line, false-casting, shooting. By now the casts seem under control, though an occasional mistimed attempt collapses in a heap. Today a fishing technique is added, that of "mending" a crosscurrent line to correct its downstream sag, lest the fly drag unnaturally. To mend is to flip the midstream portion of line up-current, jump-rope fashion, without dislodging the fly from the slower water beyond.

Three students wade into a dark, forested glide above the confluence with Nez Percé Creek and begin casting. It's said this pool produced an eleven-pound brown several years ago, though today nothing is rising. Upstream in the meadow, a breeze is buffeting casts—and bunting a hatch of tiny mayflies against one bank. A student spots a string of rises under the grassy brow, rings fading downstream like spotlights across a stage. The fish are small, but no matter. For those who stay, the fourth and fifth days will produce fish on the Yellowstone River and the Henry's Fork of the Snake. And for everyone, there's a graduation banquet to attend.

At least four organizations—three of them tackle companies—conduct major fly shing schools. All have excellent reputations. Here's a brief description of locations and prices:

Fenwick has several two-day schools from March through August in New York, Wisconsin, and at five locations in California. The dates for specific locations, however, are limited; the New York school is scheduled only in May, for example. There is no actual fishing included; the school fee includes all lunches and dinners. Three-day schools, which include fishing, are offered in Colorado in August. Three- and five-day sessions, with fishing, are scheduled in Montana in June, July and September. Prices include lunches and dinners. If you desire, Fenwick will make nearby lodging reservations. A five-day postgraduate course is offered in Montana which includes lodging at a dude ranch.

The Cortland Line Company offers weekend schools in May and June in Pennsylvania. There is no actual fishing, though several good streams are nearby if you want to fish on your own. The school fee includes

In classroom, instructor, left, and student talk tackle. Students use their own gear, or that provided by the school.

At practice pond, instructor helps student with casting.

meals and two nights' lodging at a country inn.

Bud Lilly's Trout Shop has three-day June sessions at West Yellowstone, Montana, with fishing. To assure personal instruction, Lilly limits his classes to ten students. He will schedule special three-day sessions anytime during the fishing season. At all classes, students 16 or under pay half the regular fee.

The Orvis Company has weekend schools in Manchester, Vermont, from early May through August; no fishing is scheduled, but is available nearby. The fee includes meals and two nights' lodging.

A final note: All four schools supply tackle for classes and stream sessions. If fishing is scheduled, necessary licenses and a small assortment of flies are usually included. Waders can be rented for a small daily fee. For further details, write directly to the schools.

See also: BASS FISHING; CAMPING; HIKING; TROUT.

WHERE TO FIND IT

Further information regarding location, sessions, cost, etc. can be obtained by writing to the following schools: Fenwick Fly Fishing School, P. O. Box 729, Westminster, Cal. 92683. Cortland Line Company, Fly Fishing School, P. O. Box 29134, Cleveland, Ohio 44129. Bud Lilly's Trout Shop, Fly Fishing School, West Yellowstone, Mont. 59758. The Orvis Company, Fly Fishing School, Manchester, Vt. 95254.

Students practice fly casting at the Fenwick pond near West Yellowstone, Mont. Emphasis here is on technique, not on catching fish. That comes later, in nearby streams.

Twelve Tricks to Take More Fish

Take the mystery and luck out of fishing with these tried and true methods

THERE IS NO MAGIC in a successful fishing formula. Also, there's very little luck involved. You can master a dozen little knacks, and put them to use every time you fish; a daily angler's dozen that adds to your catch impressively. Some are simple, when you stop to think of them; some, like spitting on the bait, were once thought of as medieval superstition—yet are based upon hard fact.

Why spit on the bait? Well, it works if you chew tobacco which has licorice in it. And, this attracts many bottom-feeding fish.

Now let's start the angler's dozen at the beginning—with tackle.

Use good tackle. You can't build a good house of cardboard, and you can't expect to catch respectable bags of fish with cheap, mismatched, disorganized and unbalanced tackle.

This doesn't mean it must be expensive, nor does it mean you must become a fancy expert in balancing it out. You don't have to worry about "fast tapers" and learn to think in terms of weighing tackle in ounces and what not.

Your dealer can help you immeasurably in assembling one good rod and one good reel—matched to each other and to the fish you expect to seek.

After you get it, take care of it. The experienced fisherman maintains his tackle. Clean it. Oil it. Take up on loose screws as soon as you spot them. Be good to your gear.

Pick an opponent and study him. Anyone who wants to become a butterfly collector begins by reading up on the subject. Yet there are people who believe they can

become fishermen by wetting a line and exerting no other effort whatever—particularly intellectual effort.

Pick one fish—a popular species in your area or nearby. Then study him. Read up on him. Learn his habits. Know the season when he is most commonly caught, his feeding habits, preference in artificial lures —what plug or jig deceives him. Find out what kind of water he prefers, and his reactions to outside stimuli.

Learn all you can. Then capitalize on that knowledge. Put it to use.

Be an opportunist. You should fish as often as you can. That's the answer one veteran supplies when neophyte anglers ask him about timetables, solunar periods and predicted fishing chart systems.

"The right time to fish," he says, "is at every opportunity."

Nevertheless, make it a habit to keep a careful eye on wind and weather; be at least subconsciously aware of tidal or other water situations at your fishing grounds.

And whenever conditions are just right —pack up and go.

Handle terminal tackle with care. All wild creatures—fish included—are sensitive to alien, jarring odors and substances. Trappers can't take beaver until they apply a musky scent to the trap to wipe away the human odor.

Well, don't handle a bait or lure more than you have to. Especially if you have sweaty hands. Most especially if you've been using those hands to apply sun tan lotion or insect repellent.

You can also use a cover scent on bait or lure. Some commercial products are sold for that purpose, although they are overenthusiastically endorsed by their makers as magical potions guaranteed to make the fish stand in line for a chance to assault your hook.

It isn't so. But any good preparation involving fish oil or a liquid rendered from fish scraps can serve. In a pinch, you can make your own—save the drippings next time you open a can of sardines or tuna. Keep in a small medicine bottle (with eyedropper), tightly capped. If you don't like tuna or sardines, buy a small bottle of cod liver oil at the drugstore.

A drop or so on lure or bait overwhelms human scents. It doesn't guarantee fish but does make it more likely that you'll succeed.

Handle your tackle well. If you can't make a reasonable cast, practice in your backyard until you can. Sloppy casting, with lures or bait ker-plunking violently into the water, can spook plenty of fish you might otherwise have caught.

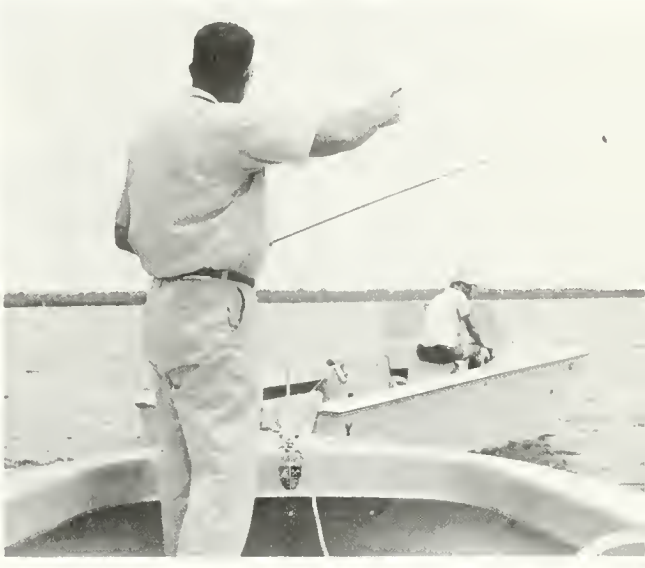
Keep a reasonably tight line. You won't feel fish bite on bait, or feel a light striker on a lure, if you have a lot of slack in the line. If circumstances (high cross-winds) make it difficult to keep a belly out of the line, keep your fingers on it above the reel to sense any action before it's too late.

Read the water and the bottom. Except when drift-fishing or trolling, you don't just dump a bait over the side and hope for a fish. You try to pick a likely spot where fish congregate. Fish are as gregarious as people. They mingle in social centers—usually near shelter and food; around underwater objects and near baitfish supplies.

Know the winds, weather and tides, and how they affect the fish you are trying to catch.

Angler's reward—the results of expert, patient fishing.

Don't hesitate to ask for advice from local fishermen.



As clues to underwater configurations that might indicate shelter for fish, look for riffles in streams; look for rips in salt water. Cast an inquiring eye on turbulence of any kind; on currents moving off flats and shoals that sweep bait into the mouths of waiting gamesters; on eddies around inlets and passes and river mouths. In rapids, look for calm patches below large rocks, eddies under and around the falls.

Also watch for darker spots that might mean holes; hunt for signs of drop-offs, ledges, bars, shoals, reefs. Look for weed patches, brush piles, snags, overhanging limbs, logs.

You might even make a few, if you want. Guides in the bayou country create brush piles and come back later to find bass. The Japanese make bamboo rafts and return to find fish in the shade beneath them. Florida fishermen have tossed packing crates and other odds and ends overboard offshore; return later to find dolphin beneath them.

You may even find fish beneath the boat! Dolphin are notoriously fond of shade, and have been caught underneath a boat that has been allowed to drift for a reasonably long period.

Experiment. Don't be a middle-of-the-roader when it comes to fishing. With lures, try changing them if one doesn't get action.

Be willing to experiment and change your pace. Top-water lures not working? Try a deep runner. Change the speed of retrieve. Not getting any bass on the other side of that narrow creek? Try dropping your bug, plug or spoon on the opposite bank and pulling it into the water—like bait that jumped or fell. This has produced many times.

Try trailers. Use a short length of line to rig a jig so it trails a larger jig or plug. This can be murder, too.

With bait, don't be afraid to change it, or replace old bait with fresh. Sometimes doubling the bait works when nothing else will.

Be willing to coax the fish. Try trolling as a means of finding them and coaxing them out of their holes. Try chum—commercial preparations or your own. Some salt water anglers carry their own food grinders, fastening them to the gunwale of the boat, and grinding fish scraps overboard. Try canned sardines—a fancy and costly but highly effective chum. Tie it in a sack and hang it over the side for longer life.

Be patient. Be willing to try patience and a little extra effort, too. One more minute over the hole, one more cast. Expend some of your energy in being observant. Note tide or current conditions and other variables. If necessary, write them down. Keep notes on wind, weather and water—so you can reasonably expect good fishing to be repeated when you return under similar conditions.

Observe local custom. Izaak Walton said it, 300 years ago: And he may note there is in Wales, and other countries, peculiar flyes, proper to the particular place or country; and doubtless, unless a man makes a flye to counterfeit that very flye in that place, he is like to lose his labour, or much of it.

What Walton meant, in modern parlance and suited to modern conditions, is this: If the boys at Backbreaker Bend all prefer to use the Dancing Dollar Special plug, maybe it's because it most closely resembles a local bait.

Be willing to give locally preferred artificials, terminal rigs, and baits, a try. They've been proven by the test of time. Save your pets for back home.

"Match the Hatch." You must not only observe the local custom of anglers, but bow also to the local preference of fish. Again, the advice derives from the fountainhead of all angling wisdom, Walton himself, who said centuries ago the fly fisherman must note what insects or bugs are falling into the river, then tie an artificial counterpart on the spot. Today's dry fly purist does it; you can, too— even if you don't fish with flies at all.

Check up. Inquire at the docks, if you must. Open a fish once caught, and examine its stomach contents as a clue to what it has been feeding on. Match its menu with proper baits or carefully chosen artificials that stimulate its preferred food.

Don't buck the odds. All things considered, it is virtually impossible for any man to catch a fish—capturing a water-dwelling creature on a hook through the persuasive effort of bait or lure. That we do so at all is a tribute of sorts to man's ingenuity and inventive skill.

So don't swing the odds against you by being clumsy. A foul cast can spook fish; falling over things in the boat can make them wary. Even tossing old cans and bottles into the water, in certain circumstances, can drive them away.

Don't mismatch lures. Everyone knows that top-water plugs are best at dawn or dusk, worst producers at high noon—as a general rule. By all means try one, if you wish; but don't stick grimly to it when it fails to produce with reasonable speed.

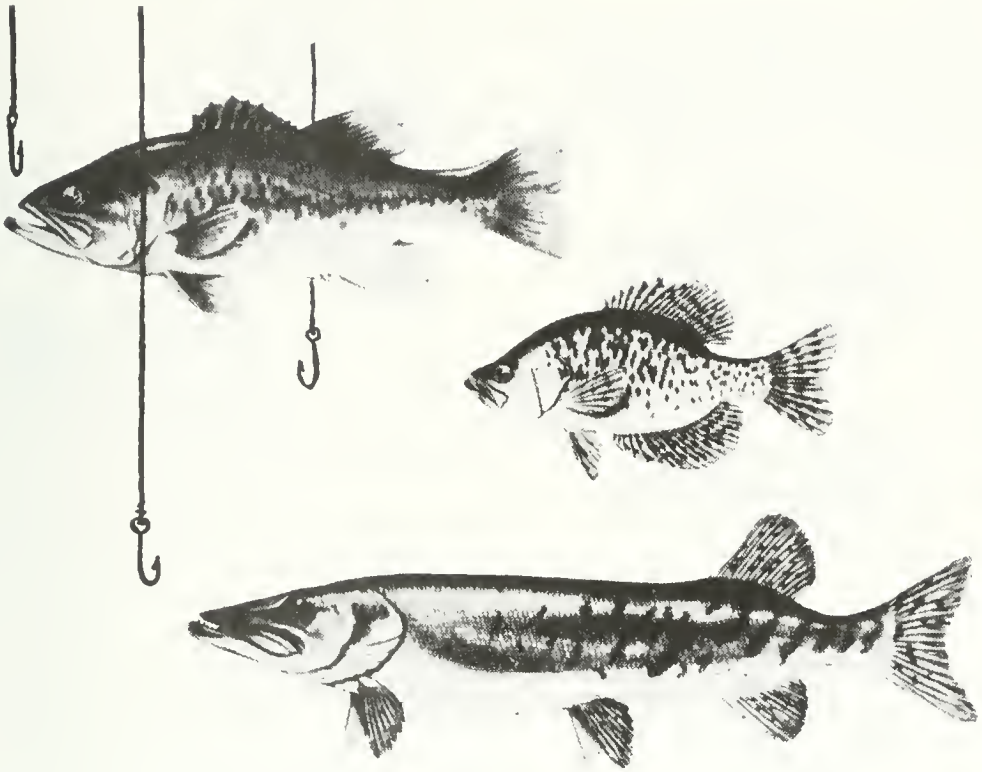
Don't hunt fish in the wrong place at the wrong time. Don't load up on lures, especially wacky ones with no record of ever having caught anything except a fisherman's roving eye in the tackle shop. Ask advice from old-timers. Apply it.

Don't follow the rules out the window. The worst thing any angler can do is to freeze his imagination, turn stodgy and stultified. And the first thing to learn about "rules" is that they don't always work.

People have caught fish on strips torn from their handkerchief, on trading stamps, and even on bare hooks. When casting was tough, they have drifted bait out to sea or over the lake on balloons; carried them down a current through an inlet on ice cubes—which dropped the bait when they melted; and on bits of soap, which can do the same. An imaginative surf caster-golfer once looped a baited line about a golf ball, teed it up on the beach, and drove it far out to sea in to the teeth of a whistling onshore wind that stymied everyone else on the beach.

Rules can be bent, but intelligently and with imagination, following a plan meant to produce results. J.M.

See also: BASS FISHING; CAMPING; HUNTING; LURES; TROLLING TECHNIQUES; TROUT.



How to Identify the Fish You Catch

Puzzled by what you've hooked? Use this guide to determine what's on the end of your line

THERE WAS A DAY when, if a fisherman called his catch a bass, trout or catfish, no one questioned him further. But today's better-read fisherman will want to know what kind of bass, trout or catfish. There are many basses that we hear about: largemouth bass, smallmouth bass, spotted bass, white bass, yellow bass—as well as saltwater striped bass.

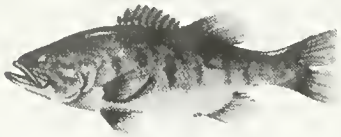
But did you know about one of the true basses, the white perch? Plus the fact that the largemouth bass, smallmouth bass and spotted bass are not true basses at all, but members of the sunfish family!

Confusing? You bet!

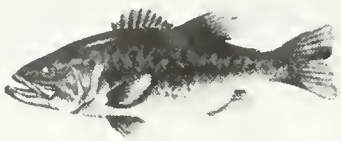
As mentioned, the largemouth bass (Micropterus salmoides), the smallmouth bass (Micropterus dolomieui) and the spotted bass (Micropterus punctulatus) are not *true* basses but are members of the sunfish family, Centrarchidae, which means anal spine.

This is the largest family of freshwater game fishes in North America, with about 25 different species. They have in common: at least three strong spines in the anal fin; all members are nesting fishes. The females lay eggs in a depression which the male has scooped out and the male stands guard until the fry are hatched and can fend for themselves. Here's how you tell them apart:

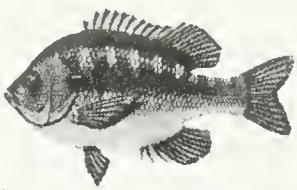
Largemouth Bass (Micropterus salmoides)



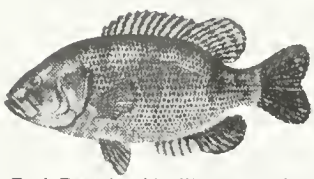
Smallmouth Bass (Micropterus dolomieui)



Spotted Bass (Micropterus punctulatus)



Bluegill (Lepomis macrochirus)



Rock Bass (Ambloplites rupestris)

Redear Sunfish (Lepomis microlophus)

Black Crappie (Pomoxis nigromaculatus)

White Crappie (Pomoxis annularis)

Largemouth bass. The maxillary, or jaw joint, ends well behind the eye; the dorsal fin is divided into two sections, the forward section with spiny rays and the rear section with soft rays; and a dark, pronounced lateral line runs from gills to tail.

Smallmouth bass. The maxillary, or jaw joint, ends below the middle of the eye; the dorsal fin is continuous, with a dip but no division; vertical bands, or streaks, mark the sides where there is no pronounced lateral line.

Spotted bass. The maxillary, or jaw joint, ends at the back corner of the eye; the dorsal fin is nearly divided, but not quite; the body markings are jagged, diamond-shaped blotches above the lateral line, and lateral streaks below it. The one thing which fishermen use for identification is the small patch of "teeth" in the middle of the tongue. This is a fairly good method, but not infallible as these appear in 98% of all spotted bass—and in about 2% of largemouth bass.

Now that you know how to identify these, the natural question arises—why aren't they true basses? The simple answer would be because generically they are mem-

bers of the sunfish family. A more logical answer would be—somebody goofed.

Why not correct the error and stop calling them basses? The answer to that would be that no one can solve this problem until most fishermen are able to properly identify these popular sports species.

To give you an idea of the welter of confusion which exists, here are the misnomers for the two most popular of these species.

Largemouth bass: black bass, yellow bass, green bass, Oswego bass, bayou bass, chub, trout, green trout, Welshman, jumper, achigan grand bouche, achigan noir, bigmouth bass, largemouthed black bass, Huron bass, bride perch, cow bass, freshwater trout, gray bass, green perch, growler, lake bass, bull bass, moss bass, rock bass, river bass, southern chub, spotted bass, striped bass, white bass, white salmon, yellow pondperch, etc.

White Bass (Roccus chrysops)

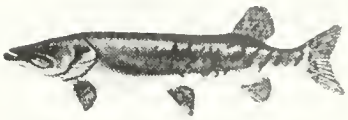
Yellow Bass (Roccus interruptus)

White Perch (Roccus americanus)

Striped Bass (Roccus saxatilis)

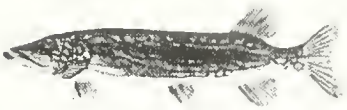
Brook Trout (Salvelinus fontinalis)

Rainbow Trout (Salmo gairdneri)



Muskellunge (Esox masquinongy)

Northern Pike (Esox lucius)



Chain Pickerel (Esox niger)

Smallmouth bass: smallmouthed black bass, achigan petite bouche, bass, bass hogfish, black perch, bronzeback, brownie, brown trout, dwarf bass, gold bass, green bass, green perch, green trout, mountain trout, redeye, river bass, rock bass, swago bass, etc.

As you can see, changing the names of these fish is a problem secondary to identifying them.

The crappies, black and white, cause a lot of confusion among fishermen. So, let's examine these.

Black crappie (Pomoxis nigromaculatus). Appearance is short-coupled, bulldog-

Brown Trout (Salmo trutta)

Cutthroat Trout (Salmo clarki)

Lake Trout (Salvelinus namaycush)

Golden Trout (Salmo aguabonita)

Dolly Varden Trout (Salvelinus malma)

like, and the markings are very dark on a grayish white body. Spiny rays in the dorsal fin number seven or more.

White crappie (Pomoxis annularis). Silvery white overall, more streamlined in appearance, head trim and more elongated than black crappie; eye large and bright; spiny rays in dorsal fin number five to seven.

As you can deduce, that spiny ray count isn't worth a hoot when it totals seven, unless you tie in the other characteristics. Even then, it pays to have a black and white crappie side by side for early familiarity.

The panfishes, smaller members of the sunfish family, are too many, too confusing because of inbreeding and variance in color characteristics, and too unreliable to pin down to definite identification. But, here are usual ways to recognize these more popular species.

Bluegill. Plain, dark flap on gill, dark vertical bands on body, small mouth, rusty-orange breast.

Pumpkinseed. Dark brown and red spots, red tip on gill flap, small mouth.

Rock bass. Red eye, large, bass-like mouth, stocky.

Long-ear sunfish. A burst of red and orange colors, long gill flap with white edge, small mouth.

The true basses belong to the family Serranidae. These are a sub-family of the sea bass family of salt water. The yellow bass and white bass live strictly in freshwater. The striped bass and the white perch live in the oceans, in brackish waters, or are landlocked in freshwater.

Here's how to identify them.

White bass. White-silver body with distinct dark lateral lines running from gill to tail. Divided dorsal, large bright eye.

Yellow bass. Yellowish body with distinct dark broken lateral lines. Slightly more compact than white bass.

White perch. Same conformation as white and yellow basses, but no body mark-

Blue Catfish (Ictalurus furcatus)

Channel Catfish (Ictalurus punctatus)

Bullhead Catfish (Ictalurus nebulosus)

ings except one faint lateral line. Silvery-white overall.

Striped bass. Same general conformation but much larger in average size. Lateral lines are sharp, distinct, diamond-shaped, running entire length of body.

How did the white perch get such a name when it's a true bass? Well, the only answers we've found don't make enough sense to list here, so let's just say this one surely needs changing as soon as possible.

Pikes. Members of the family Esocidae, all are big-toothed rascals that will eat anything a fisherman offers them, plus birds, ducklings, snakes, frogs, etc. They are the muskellunge, northern pike and pickerels.

There is a very simple way to identify these, by the squamation, or scaling, on their heads. The muskellunge has only the upper halves of the checks and gill covers scaled; the northern pike has the entire cheek and only the upper half of the gill cover scaled; the pickerels have the entire cheek and gill cover scaled.

The trouts have one characteristic in common, the little, soft, adipose fin just in front of the tail. Here are recognizable features of each:

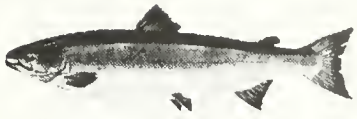
Brook trout. Vermicular, or worm-shaped, markings on back, white forward edges on lower fins.

King Salmon (Oncorhynchus tshawytscha)

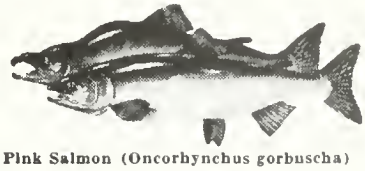
Kokanee Salmon (Oncorhynchus nerka)

Coho Salmon (Oncorhynchus kisutch)

Chum Salmon (Oncorhynchus keta)



Atlantic Salmon (Salmo salar)



Pink Salmon (Oncorhynchus gorbuscha)

Rainbow trout. Lavender-pink stripe down middle of side, dark spots over entire body, head and fins.

Brown trout. Overly large mouth, olivaceous body with dark spots and red spots with white borders. Spots on dorsal and adipose fins only.

Cutthroat trout. Like the name says, a red stripe on the throat gives a "cutthroat" appearance.

Lake trout. Gray-green body with white vermicular markings overall. Spots on dorsal and tail fins.

Sunapee trout. A strikingly beautiful fish; dark green in upper body, ivory on sides, rosy pink on belly and edges of dorsal and tail fins.

Golden trout. Exotic in appearance, with pink and blue alternating spots along lateral line, on silver-green body, with dark spots on upper body and upper fins; pink lower fins with black and white banded edges.

Arctic charr. Dark green back, shading into whitish sides and belly, with light spots over entire sides.

Dolly Varden trout. Olive-green back and sides, with orange-red spots covering entire body except belly which is whitish. Fins have white leading edges.

Whitefish (Coregonus clupeaformis)

The catfishes belong to the family Ictaluridae, and since there are more than a thousand members on this globe, we'll confine our identification to those most popular in continental United States. They have one thing in common—whiskers.

Blue catfish. Largest of the clan, over 100 pounds. Whitish blue, with forked tail, no body markings.

Channel catfish. Gray to olive-brown overall, with spots on body. Forked tail.

Flathead catfish. Next in size to blue. Brownish with light blotches on body. Head is one-third size of body. No fork in tail.

Bullheads. Small, panfish-size, member. Square or rounded tails.

The salmons belong to the family Salmonidae. All, except those which became landlocked, hatch in fresh water, migrate to the sea, attain rapid growth and return to their home streams to spawn.

King salmon. Giant of the family. Silvery greenish-white with dark spots over upper body and fins.

Kokanee salmon. Brilliant red body with green head and tail.

Coho salmon. Similar to king in appearance but has a smaller proportionate head, and more of blue-silver coloration on upper body.

Chum salmon. Oversize jaws, greenish overall with reddish overtones, and dark edge on tail fin.

Atlantic salmon. Silver-blue on back and sides, silvery white on belly. Dark spots on back, light greenish cast to lower fins.

Pink salmon. Exaggerated hump on back in spawning season, blue-green on back with spots on upper back and dorsal and tail fins.

The suckers belong to the family Catostomidae and are both too numerous and too similar to distinguish. Let it suffice to say that the common sucker is characterized by its turned-down mouth for bottom feeding.

The whitefishes belong to the family Coregonidae, and look so much alike it would take an expert to distinguish them because of varying colorations depending on habitat. The illustration will enable you to identify any member of this family. The outstanding characteristics are the weak mouth, large eye, and trout-like adipose fin ahead of a sharply-forked tail.

The perches belong to the family Percidae and include the walleye, sauger, and yellow perch. The two which may present trouble in identifying are the walleye and sauger.

Walleye. Marble-white eye, divided dorsals, splotches on body and a telltale spot at the base of the dorsal.

Sauger. Similar in all ways, except it never has the dorsal spot at base.

Yellow perch. Small by comparison with the walleye and has easily recognized dark vertical bands on the body.

There are other families which could be listed, but are omitted because of their relative unimportance to the sport fisherman.

Walleye (Stizostedion vitreum)

Sauger (Stizostedion canadense)

Yellow Perch (Perca flavescens)

How to Fillet a Fish

With a little practice and the correct knife, anyone can do it

FILLETING A FISH, any kind of fish, is the best way to prepare it for the pan. With a little practice and a sharp knife, it's easy to do.

Scaling a fish is old-fashioned. Anyone who does it is creating a lot of work for himself that is unnecessary. More important, he is not getting the flavor out of his catch that nature put there. With the exception of trout, and only those from six to twelve inches, all fish should be filleted. The skin on anything larger than a nine-inch brook trout does not add one thing to the flavor of fresh fish. In fact, it detracts from it! Even the smallest keepable panfish should be filleted and, while they offer only one large bite to a side, the effort is worth it. No bones to fool with and the preparation is much easier.

The biggest problem to overcome is a psychological one. Most fishermen will not admit they do not know how to fillet. Similarly, most outdoorsmen will not admit they do not know how to sharpen a knife. Actually, most fishermen do not know how to do either properly. They're usually too proud to ask. To do a good job of filleting, a sharp knife is needed—a sharp knife of the proper shape. Let's talk about the knife first.

Filleting can be done with any kind of knife but it is much easier with the proper knife. Every fisherman who also likes to eat fish should have one. The blade should be thin, flexible and about six inches long. If you frequently operate on fish larger than a three-pound bass or a five-pound walleye then the blade could be a bit longer. A stiff-bladed job is worthless as a filleting knife because it won't ride along the backbone with any degree of finesse. This is the most important part of fish surgery.

Every fisherman who fillets his catches has a slightly different way of approaching

flagstone: see brickwork
flameless cooker: see outdoor cooking
flashing toys: see craft projects
flint: see abrasives
flood detection: see home security sensors

the job, but the end result should be two evenly matched slabs of meat that are free of bones. Or reasonably so. Some make an extra cut on each side of the backbone before making the long side cuts. This is OK, particularly on the spiny rayed fish like walleyes, bass and members of the sunfish family. For trout, salmon and the other soft rayed fish, it is not necessary.

For demonstration purposes, all of the pictures accompanying this text show the filleting of a coho salmon. They are a large soft rayed fish and very easy to fillet. The same technique applies to smaller fish, but it is easier to fillet a fish that weighs between two and five pounds than one that is larger or smaller.

When filleting a large number of fish, the edge of your blade should be touched up frequently.

A sharp, thin-bladed knife is necessary for easy filleting. The first cut is made behind the gill cover, just missing the pectoral fin. Cut to, but not through, the backbone.

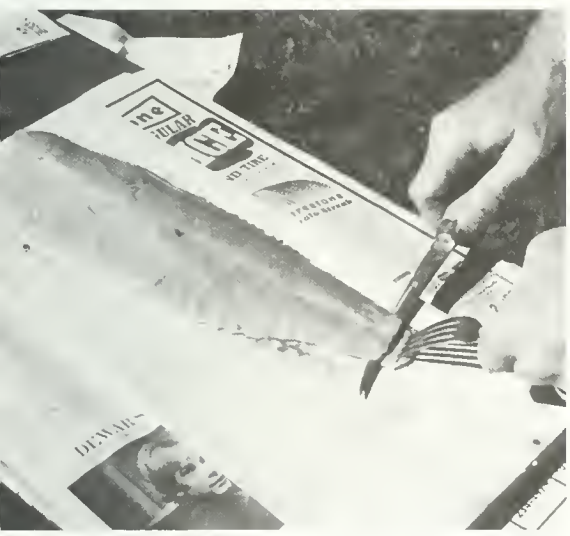
Next, using a table fork to hold the fish in place, cut into the tail section. As with the first cut, do not cut through the backbone—just to it. Using a sawing motion, track along the backbone. This is where a thin-bladed, sharp and flexible knife pays off.

For sharpening any kind of knife always push or pull the edge *into* the stone or rod. Allow the blade to ride at about a fifteen-degree angle as if you were attempting to cut a thin slice off the stone. The circular twirling of the blade on a Carborundum stone removes some metal but doesn't really put an edge on the steel.

As with all skills, practice builds proficiency. Take every chance that comes along to fillet all kinds of fish for yourself and others. (This could prove to be a bit of a bore after you become really good since all of your friends may start bringing their catches to you for treatment.) Filleting fish not only makes them easier to fry, bake or broil, but it makes them much easier to freeze. Twenty pounds of whole fish will reduce down to about half that weight in fillets, all solid meat, and will take up much less room in the freezer.

Even very small crappies, bluegills and sunfish can be filleted and fried crisp. They are better than potato chips. S.B.

See also: CAMPING; FISHING; HIKING.



▲ *Hold the fillet with the table fork, then cut through to the skin. Allow the blade to ride along between the meat and the skin. Knife should be held at about a fifteen-degree angle, or the same angle used when sharpening the knife.*

▶ *After you've started the cut grasp the skin firmly and pull, while pushing the knife. If you can't hang on to the skin, use a piece of paper toweling to firm up the grip. If the blade hangs up, see-saw a bit with the skin and blade and the skin will peel off again. For wrapping or cooking convenience, cut larger fillets in half.*

◀ *Continue cut until blade reaches the first gill line cut. A half-fish should lift right off; lay this aside for the time being. Turn the fish over and repeat the first two steps. When this is done properly, only head, backbone and tail remain.*

▼ *Touch up the blade to make sure it's sharp, then work knife gently under the rib cage bones that remain on each fillet. Cut towards the belly and they'll all cut loose along with the abdomen membrane.*

Refinishing Your Wood Floors

Wood floors have a natural beauty, but to make them gleam and glisten you must make sure they are properly finished

The glow of oak and other fine woods gleams through the glass-hard surface provided by modern plastic finishes. Most floors can be restored to brand new appearance after sanding to remove the old, worn coating.

THE FLOORS in your home are always on display. Your guests walk on them, children play there, prized rugs from the four corners of the world are displayed there. The glow of wood mellowed and polished adds a touch of warmth and comfort from one of our oldest products. A few simple, basic rules for care and finishing should keep your wood floors in shape for years.

If you are unhappy with the condition of your floors, the best remedy is to strip them down to the bare wood. Before attempting to use sanding equipment of any kind, look for raised nailheads which will surely tear sanding paper. It will take a little extra time, but you will be rewarded in the end. Using a nailset and hammer, sink any protruding nailheads below the surface. Fasten any loose boards, replace split ones and remove shoe moldings.

Remove old finish. Rent a drum sander from your local paint store. Sanding papers in appropriate grits will be supplied with the machine. You pay for the paper you use. Using open-coat paper, pass the drum sander slowly over the floor with the grain of the wood, starting at one wall and moving straight across to the opposite wall. Then, walking backwards, pull the sander back along the same path. Follow this procedure across the floor with an overlap of two to three inches.

The drum sander will not fit close to walls or into corners because of its size. For close work, use the disk sander along baseboards, on stair treads and in corners as close as is practical. With each machine use the grits as advised by the manufacturer: generally the first cut is 20 grit (coarse), the second cut 40 grit, and the fine cut 100 grit. In corners, where power machines cannot reach, hand scraping is usually necessary. An assist from varnish or paint remover can be most helpful here.

The new finish. A thorough vacuum cleaning job is essential before applying the new finish. Although the sanders you can rent have a vacuum attachment, a fine

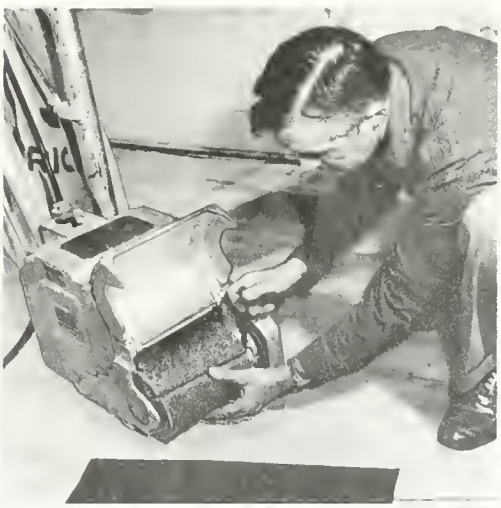
sanding dust is bound to settle on the floor and surrounding surfaces, and its removal will help to insure a slick finish. The finish used should be hard, sealing and durable for years to come.

To apply the new finish with a minimum of effort, use any popular plastic resin which can be put down with a long-handled roller. Except on pine, it is applied directly to the pre-sanded floor. For use on pine (found in many older houses), a special primer is used to seal off pitch and resin in the wood. Wood fillller is never required with this finish. Drying time of the primer is one hour. The finish itself dries tack-free in 15 minutes, is ready for a second coat in an hour.

The first coat should be lightly hand-sanded and dusted before the second coat is put on. For a brilliant gloss, a third coat reduced four parts of finish to one part reducer after a drying period of at least four hours (better still, overnight) is recommended. The third coat should dry overnight before the room is put in use. Wood floors finished in this manner do not require waxing and/or scrubbing to keep them beautiful and shining. A dry mop, or at most a damp cloth wiping, is all the care necessary.

Since the material does not settle or form

Start with a very coarse paper on the drum to cut the waxed and dirt-laden surface. Walk the sander back and forth in line with the grain. Keep the sander moving, otherwise it will cause gouging in spots.



Remove the coarse paper, replace it with 2/0 grit for the second pass to assure more smoothness.

Before sanding, countersink any protruding nailheads that may tear the sanding sheets on the drum.

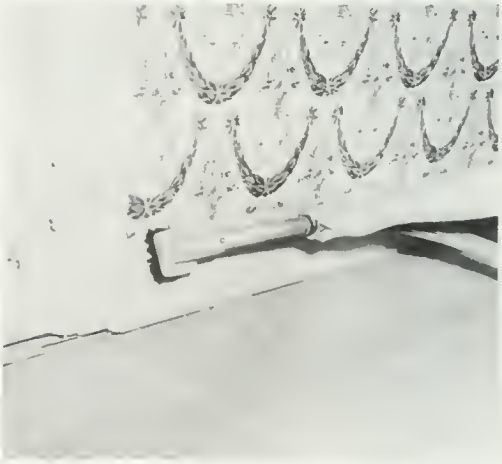
➢ *When paper shows signs of wear, change it to insure efficient operation.*

▲ *Use a disk sander along baseboards and in corners. Hand scrape where the machine can't reach, using paint remover where necessary.*

➢ *Use the vacuum cleaner to pick up sanding dust after each run-through with the machines. Even the baseboards and other surfaces where dust may settle are whisked dust-free to prevent contaminating the finish to be applied.*

▲ *Open seams and cracks in floor should be filled with wood filler. If wood is very dark, stain the filler to match.*

➢ *Plastic resin coating goes on quickly and easily with a pad applicator. Keep the finish material in a shallow pan. Observe adequate caution when using flammable material.*



a skin in a container that is sealed, leftovers can be kept for the time when a heavily trafficked area needs a touch-up. For a darker finish than the natural wood, the finish can be applied over oil stain that has been allowed to dry overnight and wiped with clean cloths. Thus you may have any tone you desire on your floors.

Shellac is another fast drying finish. A two pound cut is usually best for floors. Filler is optional; it used to be the normal procedure, but tests have shown that shellac does not require it. Shellac applied in *thin* even coats provides an elastic, tough, satiny finish that brings out the beauty of wood grain and natural color. White shellac, as the name implies, does not tone the wood; orange shellac adds an amber glow, accenting the grain. With reasonable care, shellacked floors will do the homeowner proud for years and, as they can be touched up in areas of hard wear in a matter of minutes (often a wash coat of alcohol will brighten a spot in a hurry), shellacked floors are favored by many.

Varnish, another tried and true finish for wood, is slower drying than either plastic resin or shellac. In the better grades, such as spar varnish, it is tough and washable, and is preferred by many. Since the tack-free time is about four hours, it is desirable to keep the area free from dust or lint, that may settle in the wet finish, causing extra work in between-coat sanding. On oak flooring, a filler recommended by the manufacturer should be used. It is not advisable to use filler on maple, pine or most other woods commonly used in floors.

In some areas, as at doorways, apply the coating with a clean, well-broken brush, 3 to 4 inches wide.

Waxing is a time-honored "topping" for most wood finishes, rendering them easy to dust, buff and polish. Wax prevents grime from getting through to the real finish, thus helping to ease cleaning. Water stands up in little droplets and does not seep into the wood, or stain the finish. G.D.

See also: FLOORS, BRICK; FLOORS, TILING.

FLOOR-SANDING OPERATIONS—NEW FLOORS

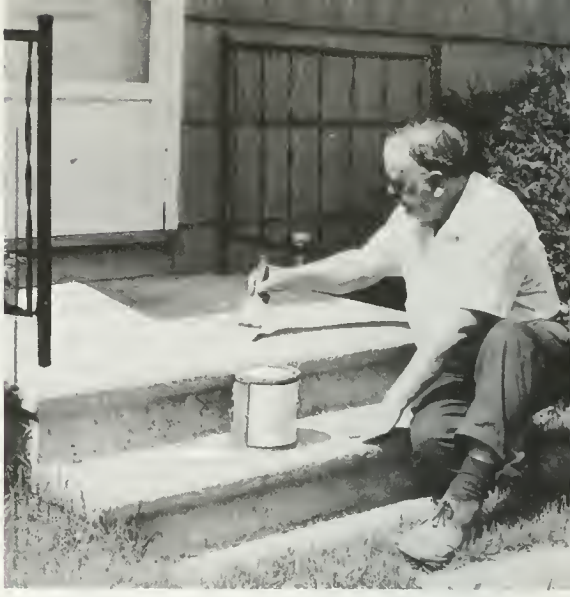
Floor	Operation	Condition of Floor	Grade of Sandpaper	
Hardwood: Oak, Maple, Beech, Birch	First Cut	Uneven Floor	Medium coarse	2
		Ordinary floor	Fine	1
	Final		Extra fine	2/0
Softwood: Pine, Fir	First Cut	Uneven Floor	Medium fine	$1^1/_2$
		Ordinary floor	Fine	1
	Final		Extra fine	2/0

OLD FLOORS

Floor	Operation	Grade of Sandpaper	
Covered with Varnish, Shellac or Paint	First Cut	Coarse	$3^1/_2$
	Second Cut	Medium	$1^1/_2$
	Final	Fine	2/0

How to Paint Wood or Concrete Floors

Special paints are available that can resist abrasion and weathering



A smooth painted concrete surface is not only attractive, but much easier to keep clean.

NOT TOO LONG AGO, a concrete floor, whether in your basement, garage or front porch, was precisely that. Rough textured and unattractively drab in color, it was nevertheless a sturdy finish that could stand up under lots of traffic. Usually, the most that was done to make it presentable was a hasty whitewash job, which did not stand up too well, or a yearly scrubbing.

Concrete floors. Modern paint chemistry has changed all that. Bright and gay floor paints have been formulated to use over concrete. After the surface is clean and holes are patched, enamels with bright, gleaming color can transform a dull front entrance porch, or enliven a basement area where the children can expend their energies in bad weather midst pleasant surroundings.

An indoor shuffleboard court is fun for young and old alike; all you need is to copy one in gay colors. Since some of these new paints can be used indoors and out, you can carry your color scheme from a walk-out basement right through to the patio and garden paths. Matching or color-relating outdoor areas to your overall plan carries out the decorating scheme full-circle.

If you plan to do extensive painting on concrete paving, a boon is the roller with a long extension handle. A roller made of extra deep pile gets into grooves and crevices, and gives maximum coverage with the least effort. In a basement or garage where there is a frequent problem of seepage, especially where falls and floor meet, give some thought to the new epoxies. They are not cheap by any means, but can lick your problem. Be sure to remove any asphaltum type sealer that may have been used in original construction, so that the epoxy resins can do a complete sealing job.

Wood floors. If your porch floor is of wood, paint it to match the house color of your trim. Be sure to use a true floor and deck enamel. These are more resistant to abrasion than the enamel used for kitchen or bathroom walls and cabinets.

To add an unusual style note to interior wood floors, go to work with a little imagination and good floor paint. Don't confine yourself to a solid color; dramatic effects can be achieved even if you lack any outstanding artistic ability. In many older houses wide plank flooring in poor condition from years of wear seems a hopeless case for a natural refinishing job, but paint can come to the rescue in style. By using two colors in alternate stripes, a sleek modern effect is accomplished. Simply use the old planks as guides. For a softer effect, two shades of the same color can be used.

If a round design suits your decor better,

as in a foyer, draw light pencil diagonals from corner to corner to determine the center of the floor, then, with a pencil on a string, scribe your circle, with a push-pin or tack firmly holding the string on center. Concentric circles can make a bright, cheerful pattern, or you may try a sunburst—it's up to you.

The spatter-dash floors found in many charming old New England homes are regaining favor so strongly with decorators and home-owners that the linoleum and plastic floor coverings now are copying them. However, for an authentic finish, fine floor enamel is the thing. After the base coat is thoroughly hard and dry, you are ready for the spatter job. Here is your chance to pick up a color from a favorite print or fabric used for drapes, etc.

Since the spatter color is used in relatively small amounts, a roller tray is sufficient for the amount you will need. You may wish to spatter more than one color. Dip an ordinary scrubbing brush in the tray of spatter color; let the bristles drain a moment so that large blobs do not result from the splatter. Then, using a wooden paint paddle, scrape toward you across the bristles. This will throw the paint spatters away from you.

Before you attempt the actual job, experiment on a large sheet of cardboard or other surface you don't care about. After a few trial runs, you will determine how much paint to use, and how far from the floor to hold the brush, as the distance from the floor helps determine the size of the flecks. Because this is a matter of taste, and all you waste is a small amount of paint, it pays to experiment.

Until you get the knack, wear glasses to protect your eyes. It is also a good idea to mask baseboards and the lower section of wall area. For the real old-fashioned effect, don't have the spatter coat too heavy; otherwise, an unpleasant unevenness occurs. Also, you may want a second spatter color. Make sure there is room for it among the spatters of the first coat.

Sometimes a border in a contrasting color will give an otherwise dull room a real lift. Simple geometric designs are easy to follow and lend themselves to use of brilliant hues. Another popular idea for recreation rooms and dens is to copy a motif expressive of the favorite game or pastime of the family. G.D.

See also: PAINT; PAINTING; PAINTING, HOUSE.

Wood floors that are exposed to the weather need the protection of a good paint coat. Whether you use brush or roller, be sure of complete coverage.

A bright floor will make it easy to retrieve small parts you may drop when working in garage or basement. Long-handled roller makes job a snap.

Using Wax to Polish Your Floors

How to get better results from waxing your floors and how to avoid wax buildup

EVEN CAREFULLY waxed floors eventually become dull and dirty. Removing the dirt and grime is a simple job and, if done correctly, rewaxing will restore the original beauty and luster.

Never use water for cleaning the old wax from a wood floor. Removers made for the purpose may be purchased at your local paint store. The best and most thorough method is to use a machine made for the job. If you do not want to buy one, they can be rented by the hour or day.

Spread the wax remover on the floor, and use the scrubbing type brushes to go over the whole surface. Old wax will come up, and with it, the dirt and grime that the wax prevented from becoming embedded in the wood finish. With a mop slightly dampened with water, clean off the old finish. Follow up with a damp clean mopping, and dry thoroughly.

Paste wax is recommended for wood floors. An excellent way to apply the thin, even coats required for maximum durability in the new finish is to put a blob of the wax in a bag made from an old turkish towel. The wax will come through the toweling at just about the right rate.

With the polishing brushes in the machine, go over the surface. A light luster will show. Follow the routine for two more coats. This will give you a hard surface that will last for months. For the greatest brilliance, felt polishing pads may be used over the polishing brushes for a final buffing.

If you choose to use one of the liquid self-polishing waxes, be sure you get one made for wood. Although these are self-polishing, polishing and buffing will increase the life of the job, and since the best way to remove the old wax is with the machine, and you still have it on hand, you might as well expend this slight additional effort.

If you want to wax tile floors, be extra careful of the type of wax you buy, as what is good for one kind of tile may not be good for another; in some cases, the wrong wax can actually damage the tile and necessitate a retiling job. Read the label carefully.

One problem with waxing floors is the possibility of wax buildup, and with the lighter colored floors, excessive wax accumulation becomes a more visible problem.

Unfortunately, there is no way to completely eliminate wax buildup. It's an inher-

ent property of water-based, self-polishing waxes. But there are several very excellent means of minimizing wax accumulation and cutting down on how often old wax layers need to be removed.

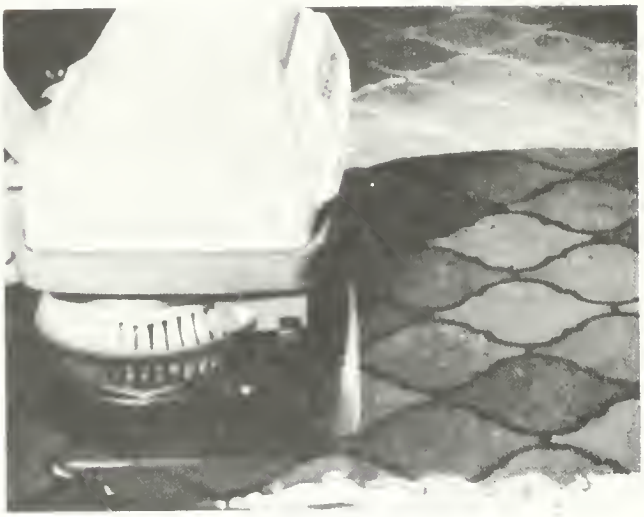
The key to the problem is understanding what causes wax build. In brief, it is the result of repeated applications of new wax coatings on top of old ones. As the wax accumulates, dirt particles are trapped between the layers—particularly in heavy traffic areas—causing an unsightly appearance. The color of many waxes also adds to the gradual yellowing of resilient flooring.

Since wax buildup cannot be eliminated, the next best thing is to minimize wax accumulation. One of the best ways to do this is to select an extremely durable wax that can be applied in thin layers. (Several waxes are now available which have outstanding wearability, permitting thin coat applications.) Quite naturally, it takes longer for thin layers to build up and cause discoloration.

It is also a good idea when selecting a wax to pay careful attention to removal instructions on the can. Stripping old wax can be a backbreaking job, and sooner or later, any wax has to be removed. So beware of waxes that suggest using more than a half cup of ammonia to one gallon of water for removal.

▼ *Apply wax.*

▲ *Polish and buff.*



▲ *Damp mop.*

Another preventive measure is to use a wax that has virtually no color of its own. Waxes are not colorless. They range in color from brownish yellow to almost pure white. A simple color test is to pour various waxes into clear containers and then compare the amount of yellowness in each. The whiter the wax, the less it discolors the floor.

Do not put too much on at a time. When the coating is too thick, it dries from the top down, leaving a soft underside that picks up dirt. The trick is to apply only enough wax to coat the floor without leaving streak marks.

See also: SPOT REMOVAL.

How to Lay Plastic Brick Floors Yourself

With new plastic products on the market, it is now possible to lay a brick-like floor in a few hours

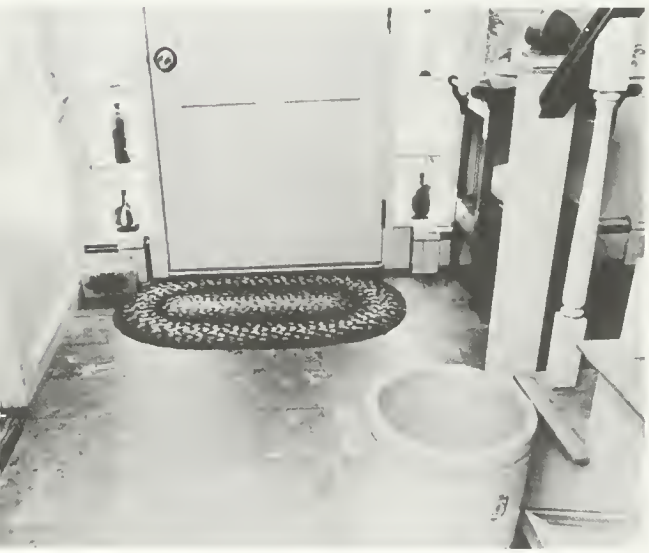
WITH SYNTHETIC polyester bricks and a plastic grouting compound, it is now an easy task to lay your own durable brick flooring. This type of flooring is rugged and will withstand more wear than any rug on the market. Its realistic brick appearance will add color to kitchens, family rooms or dens.

The process of brick floor laying has become so easy with these new products that it is possible to install your flooring in a few hours. First, spread a thin layer of plastic-base mortar compound on the floor surface you wish to cover. With a corrogated-edged tool, cover the entire area with lined grooves.

Then, simply take the high-density polyester bricks and set them into the mortar in any pattern you wish, leaving about ¼-inch of space on all four sides of each brick. Once all the bricks have been set in, use a squeeze bottle filled with special grouting (actually it is a combination of glue and grouting materials and is available at most hardware stores) and fill in all the cracks between the bricks. This grouting compound is self-leveling and will create a perfect and permanent seal on your floor.

Except for brushing on a low-gloss sealer coat, recommended to seal out dust and minimize the cleaning required, that is all the work to it. M.E.F.

See also: FLOORS; FLOORS, TILING.



▲ *Turn old and worn out tile floors . . .*

➤ *. . . into rustic and rugged brick floors by yourself in hours.*

floor stain removal: see spot removal

➤ *Corrugated-edged tool forms grooves in the mortar base before laying the bricks.*

➤ *Leave about 1/4-inch on all sides of bricks for the grouting. Bricks can be laid in any pattern you wish.*

➤ *Simply squeeze the self-leveling grout into the cracks and you are finished.*

With self-adhesive floor tiling products, it is a simple task to change the appearance of any room in your home.

Installing Pre-glued Floor Tiles

With self-adhering products, there is no mess or special skill involved in changing the mood of flooring in any room of your home

HOME OWNERS and apartment dwellers are discovering that floor tiles can be installed by almost anyone. Gone are the messy cans of black, finger-sticking glue. Instead, a new type of self-adhering floor tile comes pre-glued and eliminates mess. To install, just peel the paper from the back of each vinyl-asbestos tile, place the tile in position on the floor, press it down. That is all there is to it!

Most pre-glued tiles come in 9 x 9-inch and 12 x 12-inch squares. Measure the length and width of the floor to be covered. Refer to the chart to determine the number of tiles required. Additional tiles should be purchased because of odd trims, corners and normal waste. Once the quantity has been determined, and style selected, get the tile home and store it in the room where it is to be installed, because the room and tile should be kept at 70°F for 48 hours before and after the installation of the tile.

Lay out your room. It is best to start working from the center of the room outward. To find the center of the room, measure the wall-to-wall distance at each end of the room (disregard alcoves, offsets or other breaks). Attach a string at the center of the floor at each end. Rub the string with chalk. Then stretch the string tight and let it snap to mark a chalk line on the floor. Find the center of the chalk line, and then mark another chalk line at right angles to the first, using a square or tile as a guide.

Plan your area. Lay a row of loose tiles

The first step in laying the tile is finding the center of your room with a chalk-covered length of string. When you have formed the right angled crisscross, that is your starting point.

No messy adhesives or mixing. Simply peel away the protective paper backing and press the tile onto the floor.

Cut edges with a sharp linoleum knife if the tile must be adjusted to fit.

(do not remove backing paper) along the chalk line from the center point to one side wall and one end wall. Measure the distance between the wall and the edge of the last tile. If less than two inches or more than ten inches (seven inches for 9 x 9-inch tiles), move that center line (resnap new chalk line) a few inches closer to the opposite wall. This will improve the appearance of the floor and eliminate the need for trying to fit small pieces of tile. Check accuracy of the crossing chalk lines. They must be at right angles or your design will not be even.

This tile can be installed on any grade level, provided no excessive moisture conditions exist. It can be put down over any well-bonded smooth tile, terrazzo, concrete, and even firmly bonded painted surfaces. For best installation and appearance, the subfloor must be smooth and completely free of wax, grease and dirt.

Lay the tile. Remove release paper from back of each tile just before you put it in place. It is not advisable to remove the paper from several pieces at a time. Start laying tile from the center point, being sure the first tiles are flush with the chalk lines. Do not slide tile into place, rather butt each tile squarely to the adjoining tile. Have corners meet exactly. Do not apply pressure to the tile until accurately placed because once pressure is applied, the tile is difficult to remove. Some brands of tile are marked on the glued side with arrows that should be laid one way only. Decide which wall the arrows will point to and place them all in that direction.

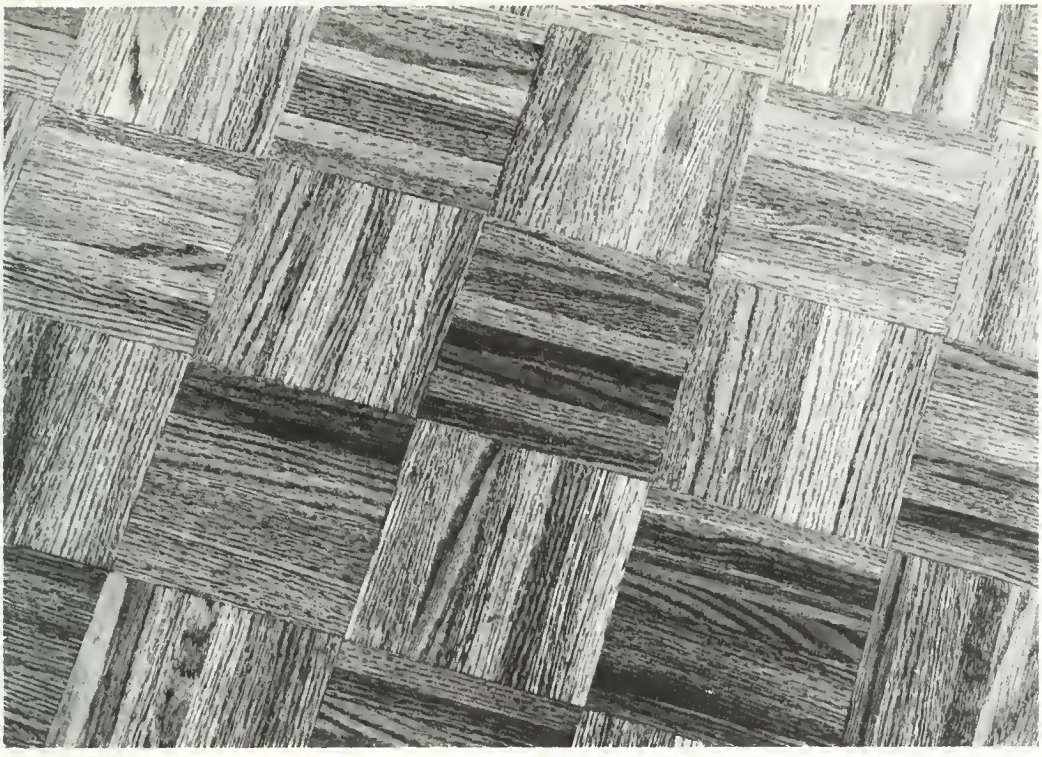
Always be sure that you cut the tile before removing the release paper. Cut on release paper side of tile, in other words, with the release paper side up. To fit around obstacles or at the edge of the room, cut with shears or a straightedge and a sharp linoleum knife. Heating tile over a hot plate or in an oven will facilitate cutting. To fit border tiles, place a loose tile exactly over the last tile in that row. Take another tile and place over the first tile. Butt the second tile against the wall and mark the first tile with a pencil along the edge of the second tile. Cut the first tile along the pencil line. To fit around obstructions, simply make a paper pattern, trace it onto the tile, and cut. Radiator legs should never rest directly on tile; fit tile around the legs.

Wait several days before you wash your new tiled floor. Give it time to "set-up." If cleaning becomes necessary, use a damp cloth or mop—never flood the floor with water. Use a mild cleaner, after sweeping up loose dirt. Now that you have finished the kitchen or bath, start looking at the other floors in the house—you never can tell, you might do it again.

See also: FLOORS.

HOW MANY TILES DO YOU NEED?

Room Area (length x width)	No. of Tiles Needed to Cover Floor		No. of Tiles Allowed for Odd Trim	
In Sq. Ft.	9 x 9 In.	12 x 12 In.	9 x 9 In.	12 x 12 In.
10	18	10	3	2
20	36	20	6	4
40	72	40	8	6
80	142	80	10	7
100	180	100	11	8
150	268	150	12	9



How to Install a Parquet Floor in a Day

Any householder can do this job quickly and inexpensively with self-sticking hardwood-faced tiles

HARDWOOD-FACED stick-on tiles are available that make it possible for a do-it-yourselfer to install a parquet floor in a room in an afternoon.

The tiles are backed by a layer of moisture-proof closed-cell plastic foam. The foam layer reduces sound levels within the room and allows the tiles to adjust to small irregularities in the floor.

To install the tiles, simply peel off a layer of treated protective backing to expose the factory-applied adhesive and push the tile into place.

Before starting, remove the molding from the baseboard around the room. When applying the tiles, leave a ⅜-inch space between the tiling and edge of the floor. This space is required for possible expansion. It will be covered when the molding is reinstalled.

The most time consuming portion of the job is the relatively simple task of cutting the edge pieces to fit. This is done with a power saw, the only special tool required.

If your layout includes an abrupt exposed edge—at a door without a sill for example—reducer strips are available. One edge of the strip is the same height as the

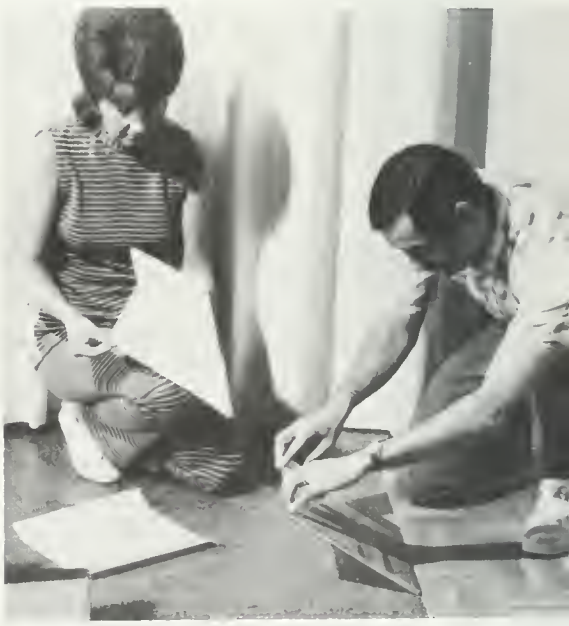
1120

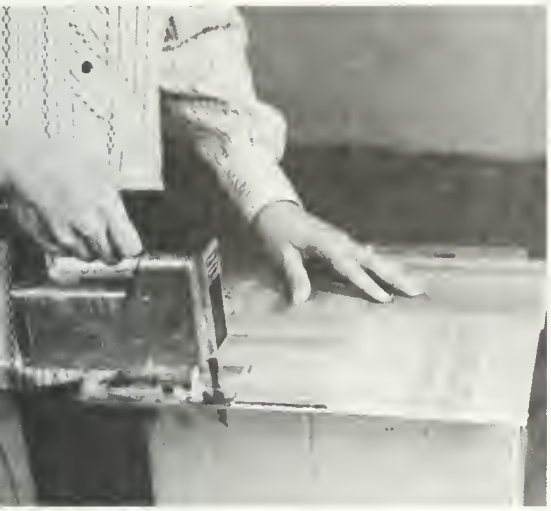
Remove baseboard molding before installing parquet floor tiles. When the molding is replaced, it will cover the expansion gap between the edge tiles and the baseboard.

First, snap a chalk line to mark the layout of the tiles.

Peel off protective paper to expose 144 dots of factory-applied adhesive that sticks the tile to the floor.

Position accurately, then press the hardwood-faced tiles into place.





▲ *With a small power saw, trim edge pieces to fit.*

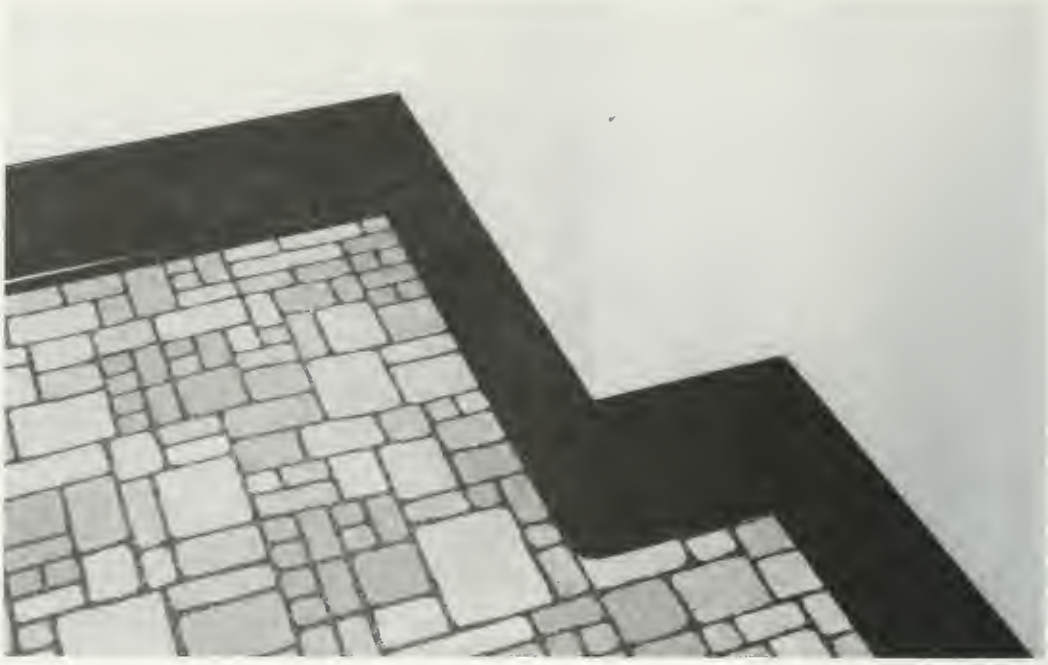
▲ *Be sure to leave a 3/8-inch expansion gap between the edge tiles and the baseboard.*

▼ *If tiles end abruptly with an exposed edge—if you only tile part of a room, for example, or at a door—use a reducer strip. Fasten it in place with double-stick tape. Matching reducer strips are available from tile suppliers.*

▲ *Replace the molding and the job is done.*

tile. The other edge is beveled to the floor, like a door sill. The reducer strip is cut to fit, then pressed into place with double-faced adhesive tape. It also can be glued or nailed.

See also: FLOORS.



How to Install Cove Base Molding

It's relatively easy to put in this tough, washable, dirt- and water-resistant baseboard material

VINYL COVE MOLDINGS are available for use as baseboards where floors are exposed frequently to water and moisture, as in kitchens and baths.

Vinyl baseboards come in several heights and colors. Strips are simply cemented to the wall at the base next to the floor. Use an adhesive recommended by your dealer. Most products include strips of baseboard molding and inside and outside corners as well as other specialized fittings.

If you are inexperienced, use the corner pieces rather than treating corners with other methods. Install them first, then measure, cut and fit the strip molding between them.

If you choose not to use corner pieces, the vinyl molding can be mitered—you will have to build your own miter box to accommodate the height of the molding—or the molding can be bent around corners.

To bend vinyl cove base around an outside corner, cut away about one half the thickness of the molding on the back side where the molding is bent around the corner. The cut should be about ½-inch wide except at the heel, where it should be about one inch wide, to allow the molding to compress where it bends.

Use a linoleum knife, a block plane or a half-round wood rasp to make the cut.

The back of the molding is skived in the same way for an inside corner. In addition, cut a V-shaped nick in the toe of the cove molding. When the molding is folded into the corner, the sides of the V will meet.

To make an inside unmitered corner, place one piece into the corner and slide it's meeting piece against it. Each piece should be flat against the wall. Then, scribe the profile of one piece against the end of the other and cut the second piece along the outline. F.C.

See also: FLOORS.

➤ *Skiving the back of a vinyl molding. Cutting away a vertical strip of material about half the thickness of the molding will allow the molding to bend around a corner.*

➤ *Once the molding is fitted and skived, cement is applied to the wall and to the molding. Then the molding is pressed into place. Be sure to follow directions accompanying the cement.*

➤ *Instead of bending the molding around corners, corner pieces can be used or the corners can be mitered. An alternative to mitering the inside corners is shown here. The piece on the left has been fitted, then moved along the wall slightly away from the corner. The piece on the right is pressed against the wall all the way to the corner. Use a divider to scribe the profile of the left-hand piece on the face of the right-hand piece. Then cut the right-hand piece along the outline. When the molding is installed, the left-hand piece goes all the way into the corner. The profiled end of the right-hand piece butts over it.*

A flower arrangement will retain its freshness much longer if you keep it away from direct heat.

Increasing the Life of Cut Flowers

With proper care and handling, you can make cut flowers last for days longer

IF YOUR CUT FLOWERS are dying and wilting quickly, perhaps you are handling them wrong. You can add days to the life of cut flowers by following these simple rules.

Gather the flowers early in the morning or after sundown. Do not break the blooms from their stalks but cut stems quickly and evenly with shears, a sharp knife or a stem cutter. For most flowers an angled, 45 degree cut is best.

Plunge the flowers in deep, cold water immediately, and if you can, let them stand for several hours. Most varieties will gain strength. Weak-stemmed, heavy-headed blooms such as tulips will become firmer when bunched, rolled in newspapers and soaked in deep cold water for eight to ten hours.

A few species (poppies, poinsettias and dahlias) stay fresh longer when the bottom of the stems are dipped into hot water momentarily. After dipping, place the flowers in deep containers with cold water. Remove foliage from submerged portion of each stem.

A preservative will add days to flowers by controlling the growth of bacteria in the water and in some cases will even help to develop unopened buds. Chrysanthemums, delphiniums and zinnias react spectacularly to preservatives. Follow the manufacturer's directions.

Make a new cut at the bottom of each stem every morning. Empty the water, clean the container to remove bacteria and refill. Many flowers drink a surprising amount of water and a new cut promotes the flow of moisture.

Do not place vases near heaters, radiators, fireplaces nor in direct sunlight.

Flowers and leaves continue to breathe and the house atmosphere can remove much of their surface moisture. If flowers seem limp or tired, place them on a porch or near a window. Let them breathe cool, moist air and most will revive quickly.

See also: GARDENING.

Increasing the Life of Cut Flowers

Cut off lower leaves so stalks will fit in your favorite vase and make the most pleasing arrangement.

Weak stemmed or heavy headed flowers will become firmer when bunched, rolled in plastic or newspaper and soaked in cold water for eight to ten hours.

Make a new cut at the bottom of each stem every morning to help plant breathe and eat.

Choosing and Planting Spring-flowering Bulbs

Planning settings and ordering your tulip, hyacinth and daffodil bulbs early are just a couple of ways you can enjoy carefree beauty when spring arrives

Mont Tacoma, a double late tulip, is large and white. Also called peony-flowered tulips, double lates are robust and long lasting.

SPRING-FLOWERING BULBS, especially tulips, are familiar as Dutch bulbs. The compound term has become less suitable with the establishment of thriving "Dutch" bulb-growing enterprises in this country. Most prominent of these are in the fertile acreages near Holland, Michigan, which has become famous for the annual Tulip Time festival, and in the Puget Sound region of western Washington.

Over several centuries, the Dutch have done the major job of improving spring-flowering bulbs, notably tulips, for door-yard use. Moreover, Netherlands-trained breeders and growers and their American-born offspring have pioneered and conducted bulb-growing enterprises in this country.

Indeed, the Dutch are still in the forefront with the best of our domestic growers in furnishing spring-flowering bulbs of all kinds for American gardening.

With an eye to historical accuracy concerning their principal product, The Bulb Growers of Holland state that the tulip is not originally Dutch. It has a decidedly international history; some species are natives of Asia, some are North African.

The flower first came to the attention of Europeans when a Flemish diplomat, Busbecq, discovered tulips in the gardens of Constantinople more than 400 years ago. From the court of the Turkish Sultan Suleiman the Magnificent, Busbecq wrote home about the strange and remarkable flower "which the Turks call tulipam."

The Turks actually called the flower "lalé," but apparently the interpreter referred to the similarity between the shape of the flower and a turban turned upside

flowers: see garden planning
flue: see fireplace

down. The flower has been known as a tulip ever since to all the world except Turkey where it is still lalé.

Native or "wild" species of tulips, referred to sometimes as "botanicals," are still being sought in far-away places to enrich our selections and broaden the culture. Our Great Plains resembles the native habitat of many wild tulips. This suggests that some of the species or botanicals may be better choices for many dooryards in the Great Plains than the highly-selected tulips so popular in Northern regions.

Tulips, daffodils and hyacinths are the major spring-flowering bulbs. The "minor" bulbs include such charming little harbingers of spring as crocus, glory-of-the-snow, snowdrop and grape hyacinth.

These have what it takes to make them dependable planting stock in the hands of amateurs and veteran gardeners alike. They produce more or less long-lived perennial growth for dooryard floral beauty over most of the country, from earliest spring until early summer.

Each bulb such as tulip, daffodil and hyacinth, and each corm such as crocus, is a miniature plant in all details, surrounded by food-laden scales. Once it has enjoyed a rest period, equivalent to eight weeks at 40°F within the bulb, the little plant is ready to resume growth under favorable conditions.

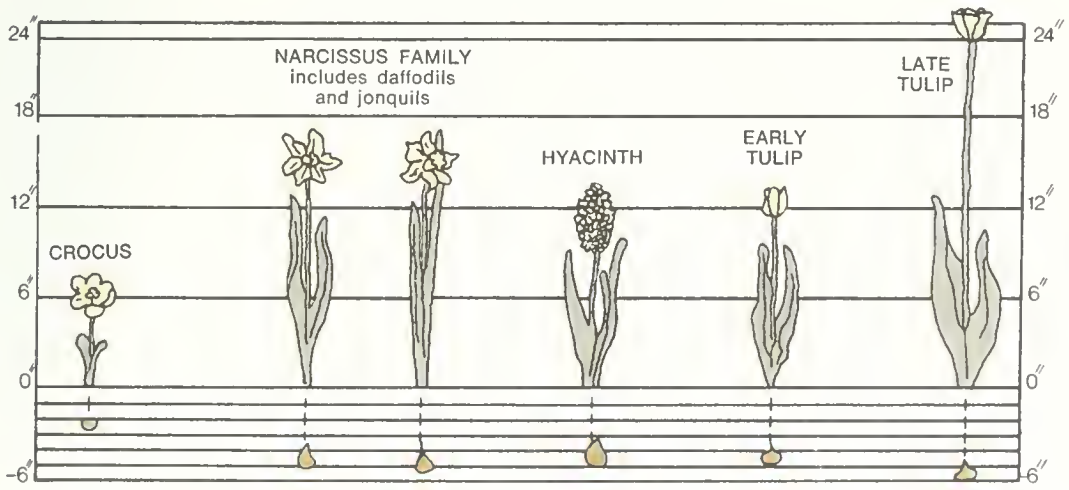
The necessary rest period is enjoyed, incidentally, by bulbs planted as usual out of doors in the principal tulip-growing areas; by pre-cooling in storage prior to planting farther south, as in Georgia and by cool storage of potted bulbs prior to winter forcing indoors.

Blossoming periods may begin a little later farther north, such as deep in Ontario, Canada, and earlier farther south. In any case, blooming periods of any bulbs may be prolonged by either planting several varieties of differing seasons of bloom, or making plantings in various locations that advance or retard blossoming.

In southern Michigan, early varieties of crocus were in bloom near the base of a chimney on March 1, three weeks before they were in bloom in the open lawn. A relatively late-blooming variety was at its best in mid-April the same year. All crocus plantings were out of bloom for the spring season by late April, having given six weeks of their cheery companionship rather than two or three weeks as from a single planting.

The research service of the United States

CORRECT DEPTH FOR PLANTING BULBS



Department of Agriculture has made helpful studies for southern gardeners, using tulips from the Netherlands as well as from American bulb growers of the northwest.

One leader of ornamentals investigations said tulips that were precooled for a sufficient length of time produced excellent flowers with long stems, even as far south as south Georgia, where the soil never became very cool.

In addition to studies in the southeastern states, a Tucson, Arizona test planting performed very well. The bulbs planted for comparison were not precooled and flowered on stems at times only two inches long, while the precooled bulbs flowered on stems that reached 12 to 18 inches.

Since precooling at 40°F for eight weeks proved best, home gardeners in the south may want to use available space in the vegetable storage of their refrigerators. Deep South gardeners should not expect spring-flowering bulbs to bloom dependably year after year as with northern plantings. Reports indicate the need for annual replanting sometimes. In Alaska, tulips are started indoors and in spring set out to bloom.

What kind of tulips? Tulips are available in a wide range of pleasing colors, tints,

PLANTING CHART AND BLOSSOMING CALENDAR

Kind of bulb in order of spring flowering	Fall Planting Time	Spring Flowering Period	Height (in inches)	How to Plant
Crocus	Sept. 1-Dec. 15	Mar. 15-30	4-5	3-4″ deep 3-4″ apart
Grape Hyacinth (Muscari)	Sept. 1-Dec. 15	Apr. 10-25	4-5	3″ deep 3″ apart
Tulip-Species (Kaufmanniana)	Sept. 15-Dec. 15	Apr. 1-30	5-15	4″ deep 5″ apart
Daffodils-Trumpet	Sept. 1-Dec. 1	Apr. 10-25	18-20	6″ deep 6″ apart
Daffodils-Large Cup	Sept. 1-Dec. 1	Apr. 10-25	16	6″ deep 6″ apart
Daffodils-Short Cup	Sept. 1-Dec. 1	Apr. 10-25	14	6″ deep 5″ apart
Tulip Species (Fosteriana)	Sept. 15-Dec. 15	Apr. 10-25	16	5-6″ deep 6″ apart
Tulips-Early	Sept. 15-Dec. 15	Apr. 10-25	14	4-5″ deep 5″ apart
Hyacinth	Sept. 15-Dec. 15	Apr. 15-30	10	6″ deep 6″ apart
Tulips-Double Late	Sept. 15-Dec. 15	Apr. 25-May 5	18-20	5-6″ deep 6″ apart
Tulips-Triumphs Darwin Hybrids- Lily-Flowered	Sept. 15-Dec. 15	Apr. 25-May 5	20-24	5-6″ deep 6″ apart
Tulips-Darwins	Sept. 15-Dec. 15	May 5-20	26-32	5-6″ deep 6″ apart
Tulips-Breeders	Sept. 15-Dec. 15	May 5-20	22-28	5-6″ deep 5″ apart
Tulips-Cottage	Sept. 15-Dec. 15	May 5-20	22-28	5-6″ deep 5″ apart
Tulips-Parrots	Sept. 15-Dec. 15	May 5-20	20-24	5-6″ deep 6″ apart

This lovely yellow hybrid Darwin tulip with a picotee edge of crimson is aptly named "Jewel of Spring."

Exotic Parrot Tulip lights up fiery red when in full bloom.

shades, and patterns of white to nearly black (deep maroon) with blues, reds, oranges, and yellows. Here are the principal groups of tulips. Each affords some choice of variety, new and old, within the group. Nurserymen's illustrated folders are useful references for this purpose.

Single early are among the first to bloom. They have short stems and are often used for indoor forcing.

Double early have long-lasting peony-like flowers on stout short stems; good also for indoor forcing in pots. The "double late" varieties are much later blooming.

Cottage varieties are "May-flowering" with longer stems than the earlier varieties. They offer a wider range of colors.

Darwins are long-stemmed with cup- or egg-shaped single-colored blossoms in a wide range of colors.

Breeders are usually brown- and bronze-colored varieties similar otherwise to Darwins.

Parrot varieties have flowers with petals that are slashed deeply along the margins and twisted. Prized chiefly for their strange appearance.

Lily-flowered varieties are well named for their pointed lily-like petals.

Multiflowered or bunch tulips have several flowers on each stem.

Mendels and triumphs are hybrids of Darwins and other types.

Species tulips. Here are some charmers listed roughly in time of bloom, from the earliest to bloom in March to early April, to the latest in late May to along in June:

Kaufmanniana or "water-lily tulip" grows six to eight inches tall; large creamy flowers marked with carmine and yellow. *Fosteriana:* 12-18 inches tall includes the popular variety Red Emperor with a remarkable combination of enormous flowers and extreme earliness; also White Emperor. *Turkestanica:* 7 inches tall; starry white flowers with yellow centers. *Eichleri:* 12 inches tall; flowers of

▲ *The Aristocrat.*

brilliant scarlet and black centers. *Praestans:* nine inches tall; several brilliant scarlet flowers on each stem. *Saxatilis:* four inches high; pink flowers with yellow centers. *Clusiana:* 15 inches tall; pointed flowers of white and rose. *Marjoletti*: 18 inches tall; flowers soft primrose with carmine edges. *Dasystemon:* six inches high, flowers bright canary yellow with white-tipped petals. *Austarlis:* 18 inches high flowers are yellow edged with reddish bronze.

Daffodils. Daffodils, narcissuses, and jonquils are members of the botanical genus Narcissus. The bulb trade now seems to prefer daffodil as the overall term. Here are the principal groups of daffodils for dooryard planting. Varieties are offered within each group.

Trumpet (such as King Alfred) with upright trumpet, as long or longer than petals of the saucer. Colors all yellow, all white, or a combination of these.

Large-cupped in which the cup is ⅓ to almost as long as the petals. Petals are either white or yellow. Cup is generally yellow, but may be tinged with other colors. Mrs. R. O. Backhouse with ivory-white petals and apricot-pink cup belongs here.

Small-cupped in which the cup is less than ⅓ the length of petals. Colors are yellow and white, but red coloring appears in cups of some varieties.

Double daffodils with a multiplicity of flowers, such as cheerfulness and Mary Copeland.

Triandrus varieties have small trumpet flowers with reflexed or bent-back petals on six inch stems.

Jonquilla and jonquil hybrids have long-stemmed fragrant flowers, generally yellow. Some types with double flowers, some with several flowers to a stem. Often used for forcing.

Tazetta daffodils have white flowers or white with cream-to-orange-red corona, the corona much shorter than the petals, and four to eight flowers per stem.

Poetaz hybrids, known also as "bunch-flowered," are represented well by geranium, a late-blooming variety with paper-white petals and golden orange cup; one of those preferred for forcing indoors.

Hyacinths. These are natives of the Mediterranean region. Those most popular for dooryard culture as spring-flowering bulbs are usually ten to twelve inches tall with stout stems of closely crowded bell-shaped flowers that vary from white and yellow through pink and red to blue and purple. Their uniformity and formality makes them especially valuable for beds and borders.

Minor bulbs for early color. These should be planted liberally in groups, under trees and shrubs, around flower beds, in nooks, and in the rock garden. The bulbs are spaced four inches apart in each direction, a little more or less, to provide good mass effect.

Crocus is the most popular of all very early spring flowers. It comes in white, in

shades of purple and yellow and in striped pattern.

Glory-of-the-snow (*Chionodoxa*) grows about six inches high with narrow leaves, six-petaled true blue and white flowers. This tends to maintain itself by self-seeding.

Grape hyacinth (*Muscari*) produces tiny blue bells on five inch stems, more or less, that merely suggest the unrelated large Dutch hyacinth. This tends to increase naturally by self-sown seeds. There is a white *muscari*.

Siberian squill (*Scilla siberica*) follows crocus in season of bloom with sprays of rich blue flowers on four inch stems. This tends to maintain itself by self-sown seeds.

Snowdrops (*Galanthus*) is in season with crocus or earlier, clumps of ribbon-like foliage and dainty nodding white flowers, it often tends to be confused with snowflakes.

Snowflakes (*Leucojum*) has coarser foliage than snowdrops, has pendant little bell-like white flowers with green-tipped petals.

Winter aconite (*Eranthus*) is extremely early with cheery yellow buttercup-like flowers during still-snowy spring; thrives so well that it has become naturalized in areas of this country.

Where to plant. Early spring is, of course, the best time to plan and order bulbs for fall delivery, for planting before hard freezes are expected. But whether your

Plant tulip bulbs upright and press the soil firmly over them to remove air pockets underneath. Be sure to plant bulbs about six inches apart—they need room to develop offshoots—and six inches deep.

Bulbs can be forced to bloom indoors earlier than they normally would outside in the garden or yard. After covering drain hole in pot bottom with a clay plug, cover the bottom with a mixture of equal parts garden soil, sand and sphagnum moss. Set the bulbs facing toward the outside of the pot.

grounds are large or small, much more gratifying results are realized when each planting site is chosen with care and the main occupants and companion plants are complementary.

Wherever they are planted, spring-flowering bulbs, especially the minor bulbs, are far more satisfying when they are used in quantity rather than sparsely. Much may be learned by strolling through neighbors' gardens and city parks to verify first-hand the versatility.

Early-flowering perennials such as phlox, alyssum and candytuft and the taller bleeding heart; also pansies and violas and such annuals as container-grown petunias may be used for transplanting without shock or setback.

Here are some more precise companionship preferences of a tulip fancier in the English countryside which are worthy of consideration elsewhere:

Pink tulips and double white arabis edged with grape hyacinths. Arabis (rock cress) is a low (six inch) white-flowered perennial ground cover that tolerates sun and drought.

Blood-red wallflowers (*Cheiranthus*) and white tulips. Wallflower grows to 15 inches tall, more or less.

Aubrieta, white arabis and pink tulips. Aubrieta (rainbow rock cress) is low growing and may be had in many colors.

Blue forget-me-nots and pink or yellow tulips.

White daffodils and forget-me-nots (*Myosotis*).

Parrot tulips and basket of gold alyssum that grows to nine inches and blossoms early.

Orange tulips and yellow wallflowers (*Cheiranthus*).

When to plant. Generally speaking, spring flowering bulbs should be planted in fall as soon as possible after delivery from the supplier. A notable exception is that imposed by precooling tulip bulbs at 40°F for eight weeks in the Deep South as previously mentioned.

Planting before the ground freezes enables some root development during fall months. The tiny plant proper, nestled in the food-laden fleshly scales, emerges from dormancy during the winter to emerge in floral splendor before anything else is in blossom.

How to plant. Bulbs are among the least demanding of plant materials in regard to soil and site. Any well-drained soil, from sunny exposure to considerable shade, is suitable for your bulbs. However, both the heavier and the sandier soils—any soil, in fact—is improved by working in compost, fibrous peat, or other organic residues during preparation for planting.

Soil should be prepared spade-deep or a little deeper, 12 inches or more. It should not be spaded when wet enough to stick to tools. Organic matter and fertilizer can be spread and spaded in during preparation of the site for planting.

An inch or two of organic matter should be helpful in light and heavy soils. About one pint of any commonly available 20% fertilizer can be broadcast over each 25 square feet of bed or border area before spading—a 5-10-5 formulation (5% nitrogen-10% phosphorus-5% potash), 6-10-4 or 4-12-4. Some successful gardeners prefer to use bone meal (about 4-20-0).

According to one rule of thumb, bulbs should be planted about three times as deep as their length and spaced about the same distance apart. The rule allows adjustment according to the size of bulbs; the larger grades of tulips, for instance, are significantly larger than those sold as the minimum blooming size.

Once the soil has been fitted to receive them, the bulbs may be spaced as desired on the surface and set separately at proper depth with a hand trowel, or set separately at proper depth by means of the handy "hole-in-one" planter. Otherwise, the area

Kaufmanniana, or "Water-Lily Tulip," are large creamy flowers, marked with carmine and yellow. They grow six to eight inches tall.

to be occupied by the colony or border planting can be opened broadly to the desired depth for spacing all bulbs before covering.

Once the bulbs have been set firmly base-down at the proper depth, they should be firmly covered to garden level, pressed firmly by treading over the back-fill and watered generously to insure intimate contact of the root-generating base with moist earth.

The minor bulbs are handled similarly, with due regard to closer spacing and shallower planting. In setting crocus bulbs, for instance, make holes of proper depth easily with the blunt end of a one inch iron rod.

Mulched over with a few inches of loose straw or other granular or fibrous non-matting material, bulbs of all these kinds resume growth safely in the soil during favorably mild fall weather. Heavy mulching with leaves should be avoided since the matted cover may seal off the bulbs completely and cause fatal smothering.

Mulch should remain until spring weather moderates to allow the delicate growth to emerge safe against the hazards of hard-freezing nights. Once the delicate growing tips emerge safely they soon become green and resistant to the bracing weather of early spring. G.M.

See also: FLOWER CARE; GARDENING.

The tall and majestic "Smiling Queen."

Fragrant pink hyacinth.

Trouble-shooting Fluorescent Lights

Fluorescent lights often flicker, burn out, hum or simply refuse to light, owing to flaws in the fixtures and tubes. Knowing the symptoms and remedies can save you electrical repair bills

IN MANY APPLICATIONS, fluorescent lighting has such obvious advantages over incandescent lighting that rarely is a new home built without at least some fluorescent lighting. Moreover, many major home appliances incorporate fluorescent lighting. Consequently, every home handyman needs to know how to repair fluorescent lights if he is to avoid, or at least minimize, expensive electrical repair bills.

In the main, fluorescent lighting is very dependable and malfunction usually requires only replacement of a worn out lamp or a defective starter. But on occasion rather puzzling problems can arise. For example, when erratic behavior results from too high or too low ambient temperatures in the room or within the fixture itself. There can be other problems too, such as severe interference with radio reception each time a fluorescent lamp is turned on. The accompanying chart provides an exhaustive breakdown of virtually all conceivable symptoms, their probable causes, and recommended cures.

To understand and use the chart knowledgeably, you must be able to recognize the several components of a typical fluorescent fixture. The fluorescent tube needs no introduction, but it should be realized that the terminal connections (often two pins) are of several kinds. Be sure to pick the right kind when you buy a replacement for a defective lamp. Each tube is held in place by two ceramic lampholders; these brackets contain electrical terminals that feed current to the pins at the ends of the tube.

The starter is a small metal can seen protruding from the fixture chassis, near one end of the tube. A slight turn releases the starter when it must be removed. Note that each starter is designed for lamps of specified length and wattage. Obtain exact replacements. If you cannot find the starter, it means that your fixture is designed to take instant-start or slim-line lamps which re-

flush tank repair: see toilet
flying decoy: see decoys
folk navigation: see navigation
footings: see brickwork
footlocker: see furniture, children's

quire no starters. An instant-start lamp is not the same thing as a rapid-start lamp. Once again, be sure to get the right kind for replacement.

The ballast is a heavy black component usually found inside the fixture chassis. You must remove the tubular lamp and open the box to find it.

Basic troubleshooting. When trouble arises, look for the observed symptom in the chart. In most cases there are several possible causes. Narrow down the possibilities by checking out those causes that are easiest to test. For example, if tube failure is indicated, try the lamp in another fixture if possible, or try a new lamp in the malfunctioning fixture. Similarly, try a new starter if the lamp has one. You should keep an extra starter on hand in any case, so if this is not the trouble put it aside because chances are you will need it another time.

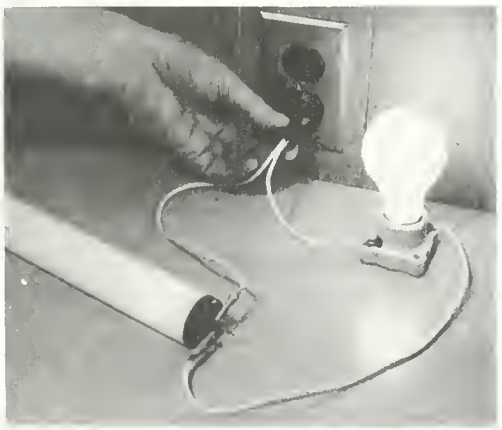
If you limit the possibilities to ballast trouble, do not throw up your hands immediately. Examine all wiring to make sure that there are no loose connections or shorts. Check the wiring diagram on the ballast to see that all connections have been made properly. Note whether the ballast feels too hot. If you have reason to suspect the ballast, you may be able to substitute a good one from another fixture to confirm your suspicions. Just be sure that the test ballast is of the same rated value as the original ballast.

It's rather unlikely that you will discover that the wrong kind of ballast had been used in the fixture, but even this is not impossible. A former owner of your home may have tried to repair the fixture, and may have put in the wrong kind of ballast.

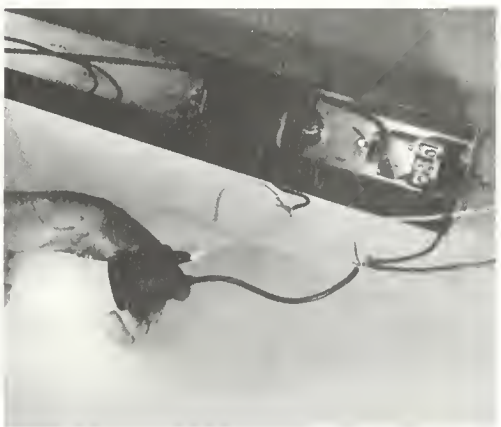
The ballast may overheat for one of several reasons. The wrong kind of lamp may have been used. An AC ballast may be used on a DC power system without addition of a necessary additional resistance. Maybe the ballast has the wrong voltage rating, or an instant-start type ballast has been put into a rapid-start type fixture. Other causes of overheating include: a short inside the ballast or in associated wiring; too high a circuit voltage; ballast improperly or incompletely installed; too high ambient temperature inside the fixture housing.

Lamp life. Fluorescent lamps generally last much longer than conventional incandescent bulbs. Under normal conditions a fluorescent lamp should last at least 5,000 hours, perhaps more than twice that length of time. When lamp manufactures estimate the "average" lives of lamps they make, performance tests usually call for switching the lamps on at intervals no shorter than three hours. If you switch your lamps on and off much more often, you are very likely to reduce lamp life substantially. Of

Electrodes are tested by wiring the lamp in series with incandescent bulb of the appropriate wattage. Good electrodes produce a glow. Remember to test both ends.



Test lamp checks the components inside a fixture. The test points are described in text and diagram. Here bulb is lit by power line junctions. Test with caution.



course, if some other component in the fixture is malfunctioning, this may also degrade a new lamp abnormally fast.

Bear in mind that any quoted "average" lamp life is exactly what the term implies. Some lamps will last much longer than that average time while other lamps—still considered normal—give out much sooner. There is nothing absolute about the term average.

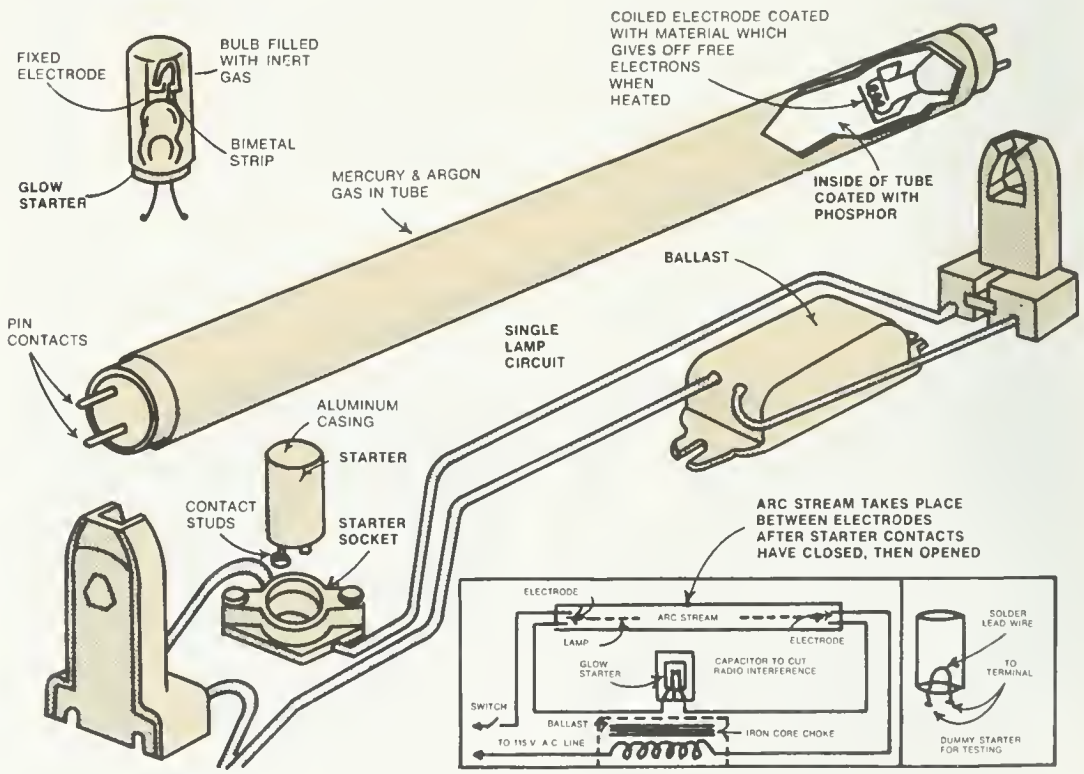
How to test lamps. If you are unable to test a suspected lamp by trying it in another fixture known to be good, and you do not want to dash out and buy another lamp you may not need, try the following tests.

One common problem is burning out of the filaments located near the ends of the tube. The only trouble is you cannot see the filaments because of the fluorescent coating inside the tube. So use this simple method to check the filaments: poke a slightly oversize pinhole through a sheet of household aluminum foil and then wrap the foil completely around a 100-watt incandescent light bulb. Beam the light emerging from the pinhole through the fluorescent tube. You can now see a shadow-picture of the filament which will reveal whether the filament is intact or broken. The test is best done in a darkened room.

You can also test a fluorescent lamp by connecting the base pins in series with a test lamp plugged into a 120-volt circuit. Use a 60-watt bulb to test fluorescent tubes rated from 14 to 40 watts, a 200-watt bulb to test a 90- or 100-watt tube, and a 25-watt bulb to test small diameter or miniature tubes. If you see a fluorescent glow under these test conditions you are assured that the lamp's electrodes are intact and producing active electrons as they should.

If a new lamp burns out too soon, you may simply have been stuck with a unit having a shorter life than would normally be expected. If a replacement burns out the same way, you should look for other problems within the fixture. Lamp burn-outs could be caused by any of the following

These are the components and workings of a standard fluorescent light.



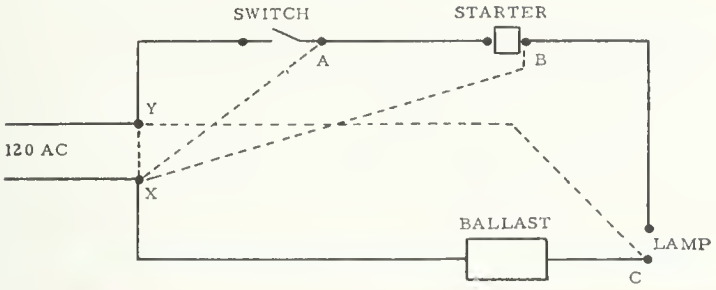


Diagram outlines method needed to check components with a test lamp. If lamp lights using XY bridge, power is available. Use AX bridge for testing switch, BX for starter, and YC for the ballast. You can easily test different circuits by using simple logic.

FLUORESCENT LIGHTING TROUBLE-SHOOTING CHART

Condition	Possible Cause	Remedy
Old lamp won't operate. May flash momentarily and go out. May blink on and off, perhaps with shimmer	1. Normal failure to exhaustion of active materials of lamp electrode	1. Remove defective lamp promptly and replace with new lamp
New lamp blinks and shimmers	1. Wrong lamp type used	1. Replace with proper type
	2. Faulty lamp	2. Replace with another new lamp
	3. Defective or wrong type of starter	3. Replace with proper starter, or use automatic cut-off type starter that overcomes on-off blinking or prolonged flashing
	4. Ballast mismatch	4. Replace with approved ballast of correct rating for lamp size used
	5. Low ambient temperature, probably below 50°F.	5. Use ballast and/or starter designed for low temperature operation
	6. Cold drafts or wind hitting the lamp	6. Enclose lamp
	7. Low circuit voltage	7. Check voltage and make any indicated corrections
	8. Loose circuit contact	8. Check seating of lamp and tightness of lampholder contacts
	9. Ballast improperly or incompletely installed	9. Check connections against ballast label instructions
New lamp fails immediately	1. Wrong lamp type used	1. Replace with lamp of type marked on ballast
	2. Wrong type ballast. May have wrong voltage rating; instant-start ballast used in rapid-start fixture; AC ballast used on DC power line	2. Replace ballast with proper type
	3. Short in ballast or capacitor	3. Replace defective component
	4. Ballast improperly or incompletely connected	4. Check connections against ballast label instructions
	5. Short in wiring	5. Check all wiring, including insulation. See if wires were pinched in fixture during assembly
	6. Ballast mismatch	6. Replace with ballast of correct rating for lamp size
	7. Voltage too high or low	7. Check voltage against range indicated on ballast label
	8. Loose circuit contact, most likely at lampholder	8. Check that lampholder is rigidly mounted and that lamp is seated properly

FLUORESCENT LIGHTING TROUBLE-SHOOTING CHART (Cont.)

Condition	Possible Cause	Remedy
Decreased light output	1. Normal decrease during first 100 hours of operation	1. Ignore
	2. Low temperature operation. Below 65°F. light loss may be 2% or more per degree F.	2. Switch to enclosed fixture or use a jacketed outdoor type lamp if available
	3. Cold drafts or winds hitting tube	3. Enclose or protect lamp
	4. Heat confined around lamp. Light loss may be 1% per degree F.	4. Provide better fixture ventilation
	5. Low circuit voltage	5. Check voltage and correct if wrong
	6. Ballast improperly or incompletely connected	6. Check connections against ballast label instructions
	7. Dust or dirt on lamp, fixture, walls or ceiling	7. Clean
Lamp flickers irregularly (may show spiraling, swirling or snaking)	1. New lamp may flicker	1. This should clear up after turning on and off a few times
	2. Defective starter	2. Replace
	3. Ballast mismatch	3. Replace with ballast of correct rating for lamp size
	4. High voltage starting	4. Check voltage
	5. Ballast improperly or incompletely connected	5. Check connections against ballast label instructions
Lamp flicker occurs suddenly	1. May develop during normal operation	1. Turn lamp off for a few seconds, then re-light
Dark, lengthwise streaks in tube	1. Globules of mercury on lower part of tube	1. Rotate tube 180° so that mercury evaporates; it may condense again on the lower, cool side
Dense black spots (about 1/2" wide, extending halfway around tube and centered about 1" from base	1. May occur near end of life on some lamps. Spots in a new lamp may indicate excessive starting or operating current	1. Check for ballast off-rating or unusually high circuit voltage
Brownish rings (at one or both ends, about 2" from base)	1. May occur during normal operation	1. No effect on lamp performance. Ignore
Ends blackened (one or both ends, 2" to 3" from base)	1. Normal. End of lamp life	1. Replace lamp
Ends blackened about 1" from base	1. Mercury deposit	1. Should evaporate when lamp is lighted
Blackening at one end only	1. Loose circuit contact, most likely at lampholder	1. Check that lampholder is rigidly mounted and that lamp is properly seated
	2. Ballast improperly or incompletely connected	2. Check connections against ballast label instructions
	3. Open circuit in electrodes due to broken electrode, air leak, open weld or other cause	3. Replace lamp. See text for ways to test for defective electrodes
Lamp blackens early in life (indicates active electrode material is sputtering off too fast)	1. Wrong lamp type used	1. Replace with lamp type marked on ballast
	2. Defective or wrong type starter	2. Replace with proper type
	3. Only lamp ends are lighted	3. Replace starter

FLUORESCENT LIGHTING TROUBLE-SHOOTING CHART (Cont.)

Condition	Possible Cause	Remedy
Short lamp life	1. Normal failure. Not all lamps will reach the rated average life	1. Replace with new lamp
	2. Wrong lamp type used	2. Replace with proper type
	3. Starter defective or of wrong type. Ends of lamp may be lighted while rest of lamp is not	3. Replace with new starter of correct type
	4. Ballast mismatch	4. Replace with approved ballast of correct rating for lamp size used
	5. Wrong type ballast used. May have wrong voltage rating; instant-start ballast used in rapid-start fixture	5. Replace ballast with proper type
	6. Short in ballast or capacitor	6. Replace defective component
	7. Voltage too high or low	7. Check voltage against range indicated on ballast label
	8. Loose circuit contact, most likely at lampholder	8. Check that lampholder is rigidly mounted and that lamp is properly seated
	9. Ballast improperly or incompletely connected	9. Check connections against ballast label instructions
	10. Too many lamp starts	10. Average life of lamp is reduced by too-frequent switching on and off
Lamp lights only at ends	1. Starter failure	1. Replace starter
	2. Wiring or ground fault in a new installation	2. Check circuit wiring
	3. Ballast improperly or incompletely connected	3. Check connections against ballast label instructions
One-third to half of tube longer than 24 inches is dark	1. Low temperature operation. Below 65° F. light loss may be 2% or more per degree F.	1. Switch to enclosed fixture or use a jacketed outdoor type lamp if available
	2. Cold drafts or winds hitting lamp	2. Enclose or protect lamp
	3. DC operation without using reversing switches	3. Install reversing switches
Persistent flicker	1. Defective lamp	1. Replace or test lamp in another fixture known to be good
	2. Ballast improperly or incompletely connected	2. Check connections against ballast label instructions
Slow or no starting effort	1. Open circuit in electrodes due to broken electrode, air leak, open weld or other cause	1. Replace lamp. See text for ways to test for defective electrodes
	2. Dirt accumulation on 40-watt rapid-start lamps may cause unreliable starting under high humidity conditions	2. Clean lamp
	3. Wrong lamp type used	3. Replace with lamp of type marked on ballast
	4. Starter at end of life or sluggish	4. Replace
	5. Ballast mismatch	5. Replace with ballast of correct rating for lamp size
	6. Open circuited ballast (a remote possibility)	6. Check ballast
	7. Low circuit voltage	7. Check voltage and correct if wrong
	8. Ballast improperly or incompletely connected	8. Check connections against ballast label instructions
	9. Possible open circuit	9. See text

FLUORESCENT LIGHTING TROUBLE-SHOOTING CHART (Cont.)

Condition	Possible Cause	Remedy
Noise (steady or intermittent humming sound)	1. Slight ballast hum normal. Objectionable hum due to improper ballast design or improper installation 2. Overheated ballast	1. Tighten all fixture parts and components including ballast, louvers, glass side panels, etc. 2. Ventilate fixture, repair wire shorts or replace ballast as needed
Color differences (in different locations of the same installation)	1. Slight differences between lamps are normal 2. Cold drafts or wind hitting tube 3. Differences in reflector finishes, wall colors, room decorations or other nearby light	1. Replace one or more lamps if objectionable 2. Enclose or protect lamp 3. Interchange lamps before assuming that lamps differ in color
Brilliance differences (in different locations of the same installation)	1. Cold drafts or wind hitting tube 2. Low circuit voltage 3. Ballast improperly or incompletely connected	1. Enclose or protect lamp 2. Check voltage and correct if wrong 3. Check connections against ballast label instructions
Radio Interference	1. Lamp radiation "broadcasts" through radio receiver 2. Line radiation and line feedback	1. Locate radio and aerial at least 10 feet from lamp. Shield radio lead-in wire and provide a good ground 2. Apply line filter at lamp or fixture, or at power outlet or panel box

malfunctions: a broken lampholder; grounding of a combination lampholder and a starting socket mounted on metal; improper wiring; one strand of conductor touching a grounded fixture; grounding for some other reason; operation of the fixture with DC current without the use of a necessary additional resistance in the circuit.

Depreciating light output. The light output of fluorescent lamps is generally quite consistent throughout the useful lives of the lamps. But when you install a new lamp you may notice that it is much brighter than the old one, or other lamps that do not yet need replacing. Characteristically, the light output from a fluorescent lamp is much higher than normal during the first 100 hours of use. In fact, manufacturers' ratings of light outputs are always based on performance expected after the initial 100-hour break-in period.

Proper use and maintenance of your fluorescent lights will ensure maximum performance. It is very important to clean the lamps and fixtures periodically because the lamps tend to accumulate films of light-blocking dust.

Also, do not expect more of your fluorescent lights than they are designed to provide. As is indicated on the trouble-shooting chart, you must use shields around conventional fluorescent tubes, or use special jacketed tubes, for maximum performance where ambient temperatures drop significantly below 50°F. Excessive heat can also reduce light output markedly. If you do not get as much light output as you think you should, the fixture in question may require provision for extra ventilation.

These peculiarities of fluorescent lighting should be kept in mind so that you do not waste time trying to trouble-shoot a fixture that is in good condition, but is merely used in the wrong way or in the wrong place.

J.H.

See also: ELECTRICITY.

Indoor Gardening with Fluorescent Lights

Exotic plants, thought impossible to grow indoors, can now thrive on these full-spectrum electrical light sources

FOR THOSE WHO SEEK to rival nature in producing exotic plants in the unlikely confines of a city apartment or suburban home, the technology for such plant culture is now available. Today's indoor garden is a far cry from "raising house plants"—with no greater care than watering them periodically, and exposing them to sunlight through the glass of your windows.

The methodical cultivation of rare and exotic species is a meticulous hobby which enlivens the home with such plant families as the gesneriads, the cacti and succulents, begonias, bromeliads, geraniums and orchids.

Basic requirements for plant growth are light, humidity, temperature, nutrition, potting media, pots, water, ventilation, pest and disease control and prevention, propagation, transplantation and multiplication of the plant material.

Plant families actually require different degrees of these factors, but a tremendous variety can be grown in a basic indoor garden under similar conditions.

Of these requirements, adequate lighting attuned to the built-in requirements of the individual plant is, perhaps, most important.

Lighting. Plants from various parts of the world share in common their respective evolutions under outdoor lighting, differing on a geographic and climatic basis in the number of hours of daylight, and in the proportionate amount of time in sunlight and cloud cover or, of sunshine and shade.

Fluorescent bulbs are available that nearly duplicate the intensity of each wavelength as encountered in natural sunlight filtered through the earth's atmosphere. Even the ultraviolet component—an element of sunlight filtered out by window glass, incidentally, depriving plants of an essential element of natural lighting—has been provided.

The best current thinking on indoor cultivation of plants—and, increasingly, in cultivation of food plants indoors—places a premium on the use of "full-spectrum" light sources which offer the lighting conditions under which the respective plants evolved and survived in nature.

A secondary benefit is the more true-to-life appearance of plants under such illumination, bringing out the natural colors to best effect.

To get the most out of your lights, control them by means of an automatic timing device which will switch the system on and off at predetermined times. Seasonal changes should be imitated as closely as possible. One expert operates his lights each day for about 10 to 12 hours in the summer and 14 to 16 hours in the winter.

Plant tray. Once the supply of light is assured, the indoor horticulturist must supply humidity, and the simplest approach is with an easily-constructed plant tray.

First, nail together a simple frame of the desired size. Waterproof it by covering and lining the frame with aluminum foil or plastic sheeting. Then fill the tray with any type of granular material such as pebbles, coarse gravel, pine bark chips, vermiculite or perlite. Pour water into the tray to within one-half inch of the top. The flower pots placed on this material will not absorb any extra water from the tray; at the same time, the material will absorb excess watering of the pots.

Several plants grown in a group will help to supply a combined humidity to each other. For additional humidity, use a cold-mist humidifier.

Many plant families require an atmosphere of high humidity. By constructing a high-humidity planter, you can easily grow orchids, aroids, gesneriads and other plants that fail so frequently in our super-dry steam-heated homes. Such a unit can also supply the extra heat that some of these plants require.

Temperature requirements. Home gardeners frequently overlook some basic facts about the temperature conditions plants demand, particularly in raising tropical plants.

Even in tropical jungle and desert areas, nights are quite cool and often even cold. Plants require these cycles of daily temperature variations in order to thrive and develop properly.

A good rule of thumb to follow is from 68° to 75° during the day and from 52° to 60° at night. If heat must be maintained at a higher temperature at night, try to keep your plant-growing areas cool.

Most tropical plants will adapt to moderately air-conditioned rooms, providing that they are not placed in the path of the direct air-blast. They should be protected from drafts by a transparent plastic diversionary screen.

Potting material. The potting medium should be fairly porous so that it does not become too soggy. The geranium family, however, can use a heavier, more compact material. The average tropical houseplant needs a medium that is high in coarse peat moss content and one that contains among other ingredients: leaf mold, humus, perlite, osmunda fiber, redwood bark wool, pine bark chips.

Soil and vermiculite are not included in this conglomerate. These two substances tend to stay too damp and also might cake up. Such exotic houseplant families as gesneriad and begonia have very fine roots, and it is very important that the potting media permit these hairlike root structures to penetrate the substance easily. In almost all cases, it is a good idea to permit the potting material to dry out well between waterings.

Surprisingly, experts find that plants raised indoors with full-spectrum lights benefit from more fertilizer than usual. Weekly feedings with all-purpose fertilizer are recommended.

When to water. The amount and frequency of watering is another important element—with excessive watering all too common. A plant should be allowed to dry out thoroughly between waterings, since nature generally mingles dry periods among rainstorms. A simple test is to poke a finger one inch into the potting mix, and add water only if it does not feel damp. Plants given a healthy lighting environment—either direct exposure in warm climates to outside sunlight without the interference of window glass, or controlled full-spectrum lighting—require more water as well as more fertilizer to sustain the vigorous rate of growth that these conditions create.

Plants also need ventilation. They benefit from circulation of air, using a small, slow-moving electric fan, and from occa-

sional access to the mix of gases found in outdoor air (usually, in winter, it's best to open the window in a room away from the plants).

Plant propagation. For many, the most exciting part of gardening is propagation of new plants. Most seed-raised plants (orchids are an exception) provide their own initial food supply with the seeds, and these do not require a fertile medium. Dried sphagnum moss rubbed through a sieve (milled) and mixed with coarse builder's sand or fine peat moss provide an excellent medium. Seed beds should be placed no further than four inches from the full-spectrum light source. The plants are carefully transferred to the potting mixture used for adult plants after two or three sets of true leaves have formed.

For asexual plant reproduction, in which propagation occurs through rooting the cuttings of woody trees and shrubs, new plant growth should be cut four to six inches long, dipped in rooting hormone, placed in a damp mixture high in peat moss, and closed in a large transparent plastic food bag. This mixture is placed four to six inches from the full-spectrum fluorescent light source. Trees, shrubs, geraniums and begonias are best raised in this fashion.

Indoor plants. Here are some special hints on various families of plants you may cultivate indoors:

Gesneriads—African violets, gloxinias, magic flowers, flame violets, goldfish plants and temple bells, among others—are mostly of tropical origin, require fairly high humidity, and thrive at a distance of six inches from the full-spectrum light source with continuous and vibrantly-colored bloom. They demand a very porous enriched potting medium for quick drainage. Fibrous-rooted plants can be pregnated from a single leaf; tubers by cutting; rhizomes can be broken apart.

Cacti and succulents—although long thought impossible to cultivate indoors for flowering, these plants were found (in an experiment at Brooklyn Botanic Garden) to be susceptible to man-made light sources which include ultraviolet portions of the spectrum. They demand sandy, porous soil, and more water than you might expect. Cacti respond to lime and bone meal additives to the potting mixture; to cooler night temperatures; and to a three-month rest period in winter, when water and light are reduced.

Begonias—fibrous rooted, rhizomatous and tuberous-rooted—are high-humidity, shade plants which do well at ten inches' distance from artificial lighting. Among the fibrous-rooted, "angel-wing" are the best houseplants. "Rex begonias," among the rhizomatous, provide gorgeous foliage.

Bromeliads—long thought of as outdoor plants, have been grown successfully indoors under lights.

Geraniums, also considered an outdoor plant in the past, now grow well indoors under proper lighting. They require cool temperatures, a minimum of fertilization, and regular pinching to create compact busy plants. They are easily propagated from cuttings.

Orchids require a high-humidity chamber, plus a daily mist spraying rich fertilizer or fish emulsion, and potting in closely-packed osmunda fiber, pine bark chunks, or coarse pieces of lava or pumice stone to drain water quickly. In some types, offsets can be removed and reported, for others, pseudo-bulbs can be separated and reported. Lighting should be of high intensity—six full-spectrum tubes about two inches apart.

These, of course, are among the more spectacular plants the home gardener can raise indoors. Annuals, too, provide gratifying results. And even tomatoes can offer tiny but tasty fruit in a plant under 16 inches in height, for the delight and pride of the indoor gardener.

See also: GARDENING.

Natural stone or tile makes a distinctive entryway which dresses up your home and adds far more to its value than the total cost of materials plus labor.

Easy-to-install Stone Foyer

A do-it-yourself stone foyer is as attractive and structurally sound as a contractor's, but costs hundreds of dollars less

ASK A CONTRACTOR about putting a stone floor in your house, and he will start talking about a two-inch concrete bedding plus major structural changes to support the added load and compensate for the extra thickness. The price will make you want to forget you even asked.

Here is a new method—one you can do yourself—that neatly sidesteps these problems. No structural changes are needed if you have a sound floor. And the price is reasonable.

You come out ahead three ways. You can pick stones smooth enough and flat enough to lay directly on the wood subfloor. By using ceramic tile techniques, you avoid the thick concrete bedding required to set and mortar irregular shaped stones. And epoxy concrete, a new material foreign to both masonry and tile work, gives you sound, non-cracking joints.

You can give your floor real personality by using colorful and meaningful stones picked up on your travels. Fool's gold, crazylace agate from Mexico, petrified wood, and jasper from the Pacific Northwest can decorate your floor. A trip to the salvage yard could yield smooth-faced marble from a century-old soda fountain and large pieces of slate from old school house blackboards.

Thin stone is available from dealers. Ideal are Colorado red flagstone, beautifully patterned Crab Orchard sandstone from Tennessee, and colored slate from Vermont and Pennsylvania. Do not overlook the tan and buff Arizona sandstone. Avoid limestone which is too soft to work nicely. Common quarry tile makes for easy working as does the sheared, smooth Colorado flagstone called "patio blocks." Whatever stone you choose, even if you have to buy all of it, the cost should not exceed 50 cents per square foot.

frames, picture: see picture framing
friction discs: see clutch
friction pads: see disc brakes
front porch seats: see early american
frostbite: see survival

First decide the area you want to cover. When you remove existing surface flooring, most houses have a ¾-inch height difference between subfloor and other flooring. This determines the maximum thickness you can use.

Sort dealers' piles with calipers for slabs within your maximum. Thinner pieces are fine. They can be shimmed up to the right height. Flatness is your key requirement. Attractive slabs that are flat within ⅛-inch make a safe, good-looking floor. Thicknesses of ⅜, ½, ⅝, ¾, ⅞, and 1 inch are easy to find. Check each piece for flatness by laying it on a flat surface and testing for rock. Pick stones without cracks which show no signs of splitting or lamination. Minor bumps or hollows can be corrected if size and pattern are good.

Souvenir stones which are rounded or thicker than required can be cut down with a carbide particle wheel on a radial arm power saw. Or use a coarse rasp, disk sander, or carbide grit grinding wheel to remove high spots.

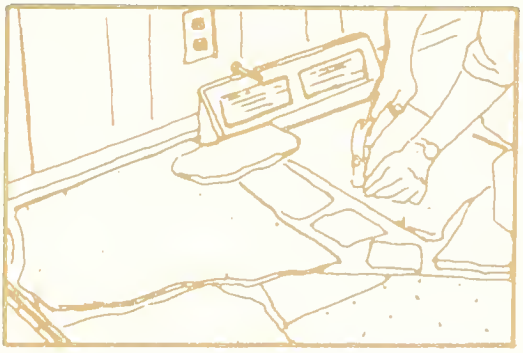
Lay plastic film or other material on floors around work area to prevent scratches. If subflooring is loosely nailed, renail it to make a solid joint with floor joists. Drive 1½-inch ring-shank nails at 2-inch intervals. If there are large gaps between floor panels or the floor is weak, reinforce it by nailing and gluing panels of ½-inch plywood between the joists underneath the subflooring. Cure flexing caused by inadequate support by inserting additional floor joists between existing ones and installing a jack pole in the basement.

Level strips of ¼-inch Masonite or plywood the thickness of the stone nailed along walls allow even strikeoff of the mortar (grout). Mark strikeoff height on door sills in pencil.

Shim material raises stone to finished height. Cover entire area if stone is too thin to match floor height. For example, match ⅝-inch quarry tile to one inch floor height with ⅜-inch plywood shim, securely nailed down.

If you cover an area larger than five-feet square, divide it with aluminum angles screwed down. Make sure leg height does not exceed stone thickness or it will show on finished floor.

To use stones of different thicknesses, shim each one to the level of your floor with plywood cut to shape. Support irregular pieces of stone with ring shank nails left sticking out far enough to hold up the hollows in the stone. Minor depressions and larger areas less than $\frac{1}{16}$-inch deep require no special supports.



Mark shim location when positioning stones. Note aluminum angle divider, close nailing pattern on shims, and level strip to make mortaring easier.

Epoxy concrete fills shallow grout joints between floor stones. Mix small amount of epoxy to consistency of thick paint and apply with paint brush.

Before laying stone permanently, clean it with a wire brush. Use a blunt chisel to remove split or loose edges and scale. Wash with water to remove dust. While stone is drying, sweep and drymop floor, nail down shims, and wipe clean again. Brush on a thin coat of ceramic floor tile mastic to seal area against water absorption.

When dry, apply more mastic liberally with a coarse-toothed spreader, position stone, and force it into the mastic. Walk on it several times while it dries to make sure each stone is fully seated.

While waiting for the mastic to dry, drive ring shank nails at 3-inch intervals in gaps between stones. Nail heads should project to half the height of stone surface. Nail heads hold mortar grouting solidly in place and prevent its lifting.

Conventional mason's mortar mix is used to grout joints. Soak surface with water to prevent stone from soaking up water while concrete sets. Sponge applies water and soaks up puddles. Dash concrete into joints with a small trowel. Make sure it goes under cleft edges and around nail heads. Drag joints with wet sponge to finish. Also sponge concrete from stone faces. Sponge dragging recesses joints about ⅛-inch and brings coarse material to the surface. This forms an ideal surface for epoxy concrete. It also prevents streaks which can appear on finished floor if mortar is allowed to dry on stone faces.

Clean stone to bring out color and improve bonding. An 8-to-1 mixture of water and muriatic acid does the job. First soak floor with water to prevent acid from soaking in. Wear rubber gloves. Apply acid with a clean cloth and scrub in. Sponge off several times with fresh water to rinse away the acid.

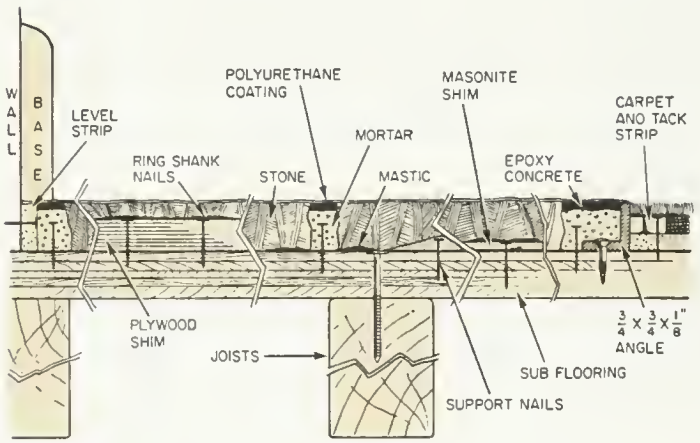
Epoxy concrete is a very fine grained synthetic concrete that dries fast and sticks to practically anything. Unlike conventional concrete, thin coatings adhere well and resist cracking. Mix it according to instructions and apply carefully with a paintbrush. Use two coats to build up the required thickness.

When it sets, sand joints and stone edges with coarse, cloth-backed emery to remove sharp edges. Epoxy joints look like molten glass poured over the mortar grout.

Finishing touches on your stone foyer include another washing and two coats of polyurethane plastic "varnish." Non-skid floor wax forms final surface. Lastly, you can replace the base molding to finish the job.

Maintaining your stone floor is simple because it is waterproof. Wet mop plus buffing and rewaxing as traffic requires does it. Repair deep scratches by sanding through coating and scratch with fine grit paper, and recoat. Patch joints with epoxy concrete.

See also: FLOORS.



Cross section of finished stone floor shows details of construction used.

Repairing Your Fuel Pump

A faulty fuel pump can hurt your gas mileage or even keep your engine from running. It is easy to repair and, with a little know-how, fairly simple to rebuild

ONE OF THE EASIEST of all parts in your car to understand and trouble-shoot is the fuel pump. It is also one of the most important because a faulty pump will cause your engine to run ragged or not at all.

Fuel pumps used in today's cars are primarily (Vega and some sports cars excepted) of the mechanical diaphragm type. This diaphragm creates pressure inside the pump by pulsating back and forth.

One noticeable difference in fuel pumps used in today's cars is that some have the fuel filter built right in, while others have a separate filter tapped into the fuel line between the pump and the carburetor, or inserted into the fuel inlet in the carburetor.

Pump troubles. Fuel pump troubles are limited to four. It pumps too little gas, too much gas, leaks gas or leaks oil.

An oil leak usually is a simple matter to correct by tightening the nuts or screws that hold the pump, or by pulling the pump and replacing the gasket.

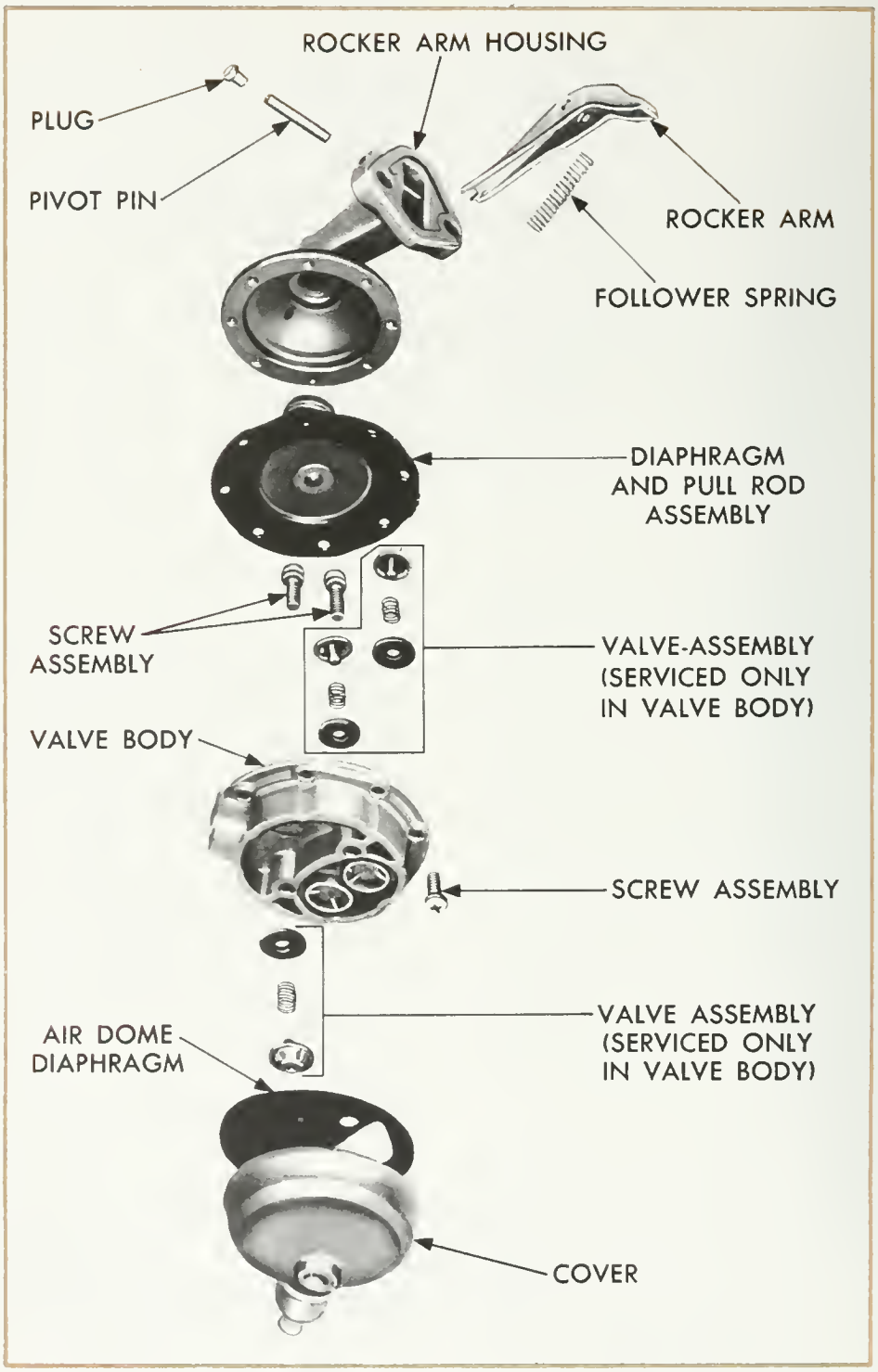
A gas leak may be coming from the main chamber (which can be cured by tightening the cover screws), or from loose inlet or outlet fittings (which can be corrected by tightening). If tightening the fittings does not cure the leak, they must be replaced.

If your engine refuses to run, or it coughs and falters, the trouble may be that too little fuel is being supplied to the carburetor by the pump. If, on the other hand, your engine is hard to start, idles roughly, or you see gas dripping from the carb, the pump may be supplying too much gas or the diaphragm may be ruptured.

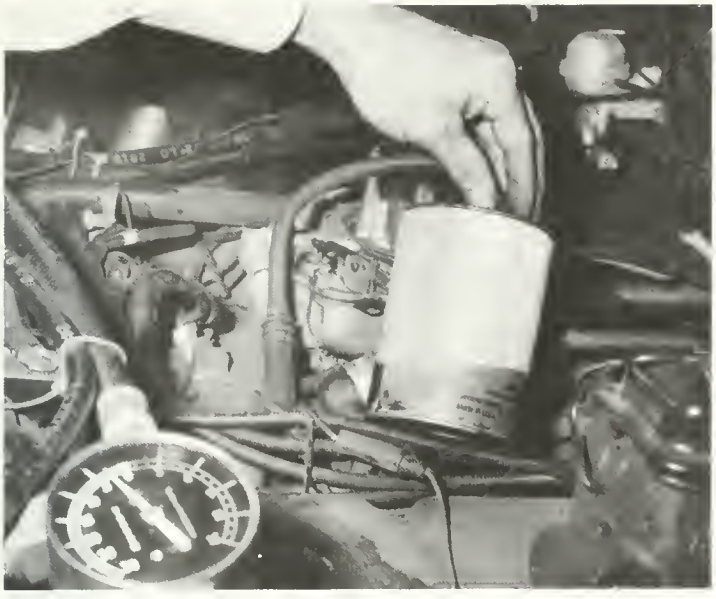
Any of these troubles can be caused by things other than the fuel pump. However, it is a good idea to check the pump first since it is an easy job to do and you can pinpoint the cause of the problem immediately without having to go through a time-consuming inspection of other parts. A bad carburetor, for example, can also cause the kind of trouble just described, but to determine whether it is the cause entails a complete carburetor disassembly.

Test pressure. A fuel pump is always tested with the pump in the car. The best way to check it is with a fuel pump analyzer (also called a vacuum or pressure tester). This tool records the pressure at which the pump is operating.

Fuel pumps push a large volume of gas



▲ *Exploded illustration shows fuel pump components.*



Fuel pump volume test should always follow pressure test.

per hour to the carburetor when the engine is operated at normal highway speed. The gas flows at a pressure of from as low as 2½ pounds per square inch (psi) to as high as 8 pounds, depending on the car.

To accurately check your fuel pump with the gauge, it is necessary to know the exact pressure limits of the pump; check your car's service manual.

To test the pressure limits of your pump, disconnect the fuel line at the carburetor. Attach the proper-sized adapter (which you will find in your pressure tester kit) to the line. Screw the pressure gauge hose into the adapter.

Start the engine and let it idle. The gauge should read somewhere within the limits. If so, turn the engine off. The needle on the gauge should remain constant or drift back very slowly toward zero. If it drops back suddenly, something is wrong with the pump.

If the reading is lower than that specified, it means the pump is not pushing out enough gas. If higher, the pump is delivering too much gas.

If the pressure is too low, it usually means that one part of the pump is badly worn, several parts are slightly worn, the diaphragm is ruptured, the valves are dirty, or the valve seats are clogged. If pressure is too high, the trouble is probably a tight fitting diaphragm, one that is too strong, or a pump link which is frozen to the rocker arm.

Check fuel delivery. In addition to the pressure gauge test, you should also make a fuel capacity test to determine if the pump is delivering the correct amount of fuel to the carburetor. More than likely, if the pump pressure records correctly, the amount of fuel it is delivering is just right. But a malfunction other than the fuel pump can cause fuel capacity to be cut down.

Generally, the pump in a passenger car delivers from ¾ to a full pint of fuel to the carburetor every half minute. To test for capacity, disconnect the fuel line at the carburetor and hold a pint measuring cup beneath the open end of the line. Let the engine run a half minute to determine whether the proper amount of fuel (¾ to 1 pint) is being delivered.

If the pump is not delivering enough fuel, the cause of the trouble might lie in the gas tank, in the fuel line system, or in the filter, as well as in the pump itself. First make sure there is gas in the tank.

Replacement alternatives. Once you have determined that the pump is faulty, you have one of two avenues open to you. If you do your own mechanical work, it would

be less expensive to try rebuilding the old pump. If, however, a mechanic does your work, you would be better off installing a new pump since the cost of a rebuilt is only a few dollars less than the price of a new one.

There are two types of repair kits available. One is an inexpensive kit which contains a new diaphragm (since this is the most likely part of a pump to go bad), valves, and gaskets. The other is a repair kit which contains all parts for a complete overhaul.

Before purchasing a kit, disassemble the pump to see which part or parts are worn.

Rebuilding of pump should include replacement of check valve assembly, to which pen points.

Pen points to pump arm which should be inspected for wear, and if outer surface (which is in contact with camshaft) is worn, the arm must be replaced. In this case, the cheapest way is to get a new or rebuilt pump, as replacement arms are hard to find.

If it is just the diaphragm, the less expensive diaphragm repair kit should be purchased.

Note: On many cars, you do not have a choice when a pump fails. Virtually all Ford products, particularly in recent years, have pumps that can only be disassembled and rebuilt in a factory. And the electric fuel pump in a Vega also is a disposable type.

Repair procedure. Pump repair starts with pump removal. Once the pump is off, discard the gasket between the pump and engine.

Before taking the pump apart, remove exterior dirt with solvent and file a mark across the flanges to serve as a guide for reassembly.

Remove the screws that hold the two parts together. The cover has the check valve assembly in it. The lower part has the diaphragm, pump arm spring, pump arm and linkage.

The check valve assembly is normally held by a simple screw-down retainer. The diaphragm is mounted to a shaft, and the method of retaining this to the pump arm linkage varies from make to make, but the way to disconnect it should be obvious. A pin, which can be pulled with pliers, normally retains the pump arm.

The pump arm should be inspected for wear on the side that comes in contact with the camshaft. If worn, it should be replaced.

After making the necessary replacements, reassemble the pump. Place it back in the engine, making sure you insert the new gasket between the pump and the engine block. You must also make sure the cam eccentric engages the pump arm in the proper way to prevent a broken arm or link, which can, in turn, cause possible engine damage. The pad of the arm, which is the arm's flat surface, must rest against the cam.

See also: PARTS REPLACEMENT, ENGINE.

How to Choose a Heating System

Get the facts first, and analyze them, before deciding whether to heat your house with gas, oil or electricity

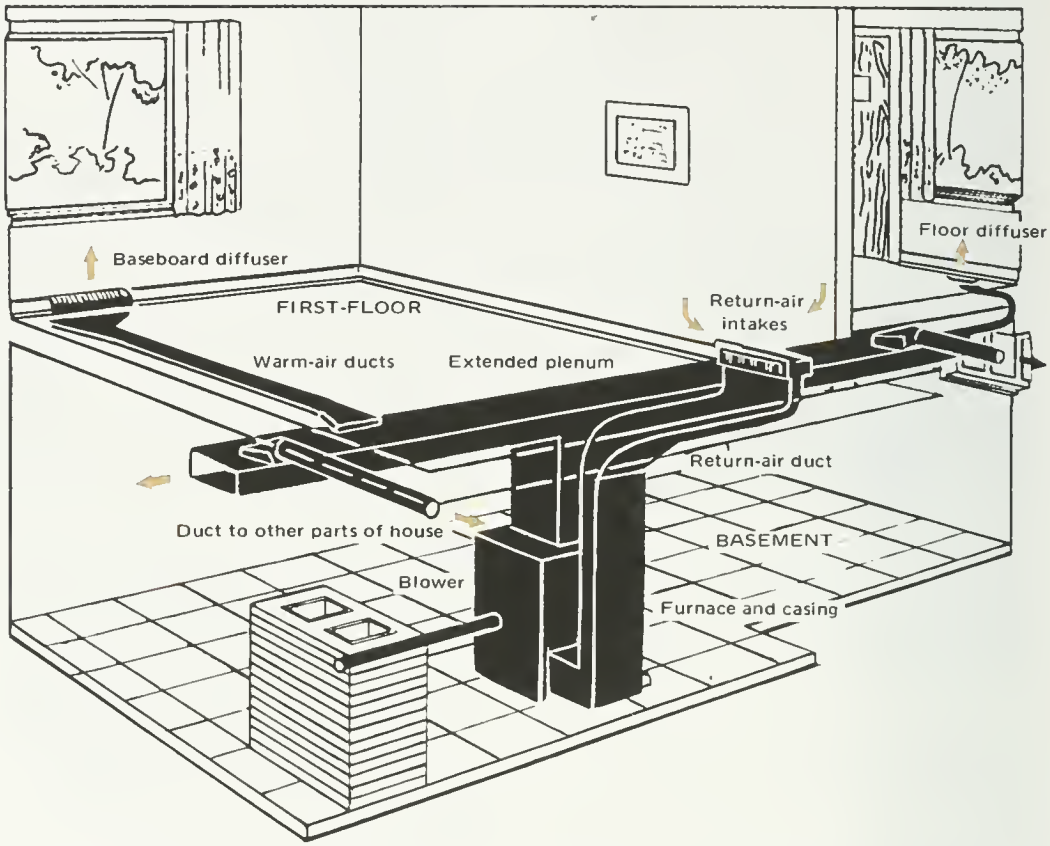
THE EASIEST WAY to decide what kind of heating system you should choose for your new home is to contact a local heating expert for advice. He might be a representative of the local gas or electric power utility, an oil distributor or a contractor who installs home heating systems. The *hardest* way to make a good decision is to contact more than one such expert.

For example, the home heating expert for one gas company claims that "Gas heating in this area is equivalent to heating with 18¢ per gallon fuel oil (it actually sells for 20.9¢), and gas is about 2.1 times less expensive than electrical heating. Thus, the amount of gas heat you can buy for $100 would cost about $210 using electric power. Gas heating," he adds, "goes into almost 90 percent of all new homes being built in this town where gas is available."

But, the local electric power company's house heating expert feels that these claims are outlandish, "I don't know what the gas company's figures are based on. They are an absolute myth. When they bandy the figures around, they assume certain conditions; if we could choose our own conditions—well, you know what they say about statistics! We have builders here who have built nothing but electrically heated homes during the past six years. Our competing days are over. We have got it made!"

The local oil distributor implies that the gas and electric company fellows are full

fuel system: see carburetor
furnace: see heating systems, home



Air circulation in forced warm-air system is maintained by blower in furnace. Air is warmed by heated surfaces of furnace and distributed to various rooms through supply ducts and outlets. Blower also draws room air back to furnace to reheat and filter.

of hot air. "To obtain 100,000 heat units (BTU's) would cost about 14.9¢ using oil, 18¢ using gas and 52.7¢ using electricity. The heating of private homes is about nip and tuck between gas and oil; electricity has a long way to go."

Three experts—three wholly different answers! None of these experts actually prevaricate, each merely tells that part of the truth that makes his own company's product look most attractive; each accuses the other two of engaging in limited and juggled truths.

For example, the oil company figures indicate only *gross* heat values for the three fuels; they do *not* take into account the fact that a significant portion of gas or oil heat generated is unusable because it goes up the chimney, whereas electric heat generated by radiant heaters is 100 percent usable. Handily overlooked is the fact that gas and oil burners also use some electric power to operate pumps and blowers. Finally, the oil distributor ascribes higher per-unit prices to the competing fuels than do his competitors when talking about their own price scales.

Heating Economy Rule No. 1. Do not accept at face value cost comparison figures obtained from a single source. Demand detailed cost breakdowns from competing heating businesses, and let each criticize those figures that do not agree with his own. Insist that all calculations be in

terms of *usable* heat, and that all costs are included (electric power used in oil and gas heating systems, annual maintenance costs, relative installation costs).

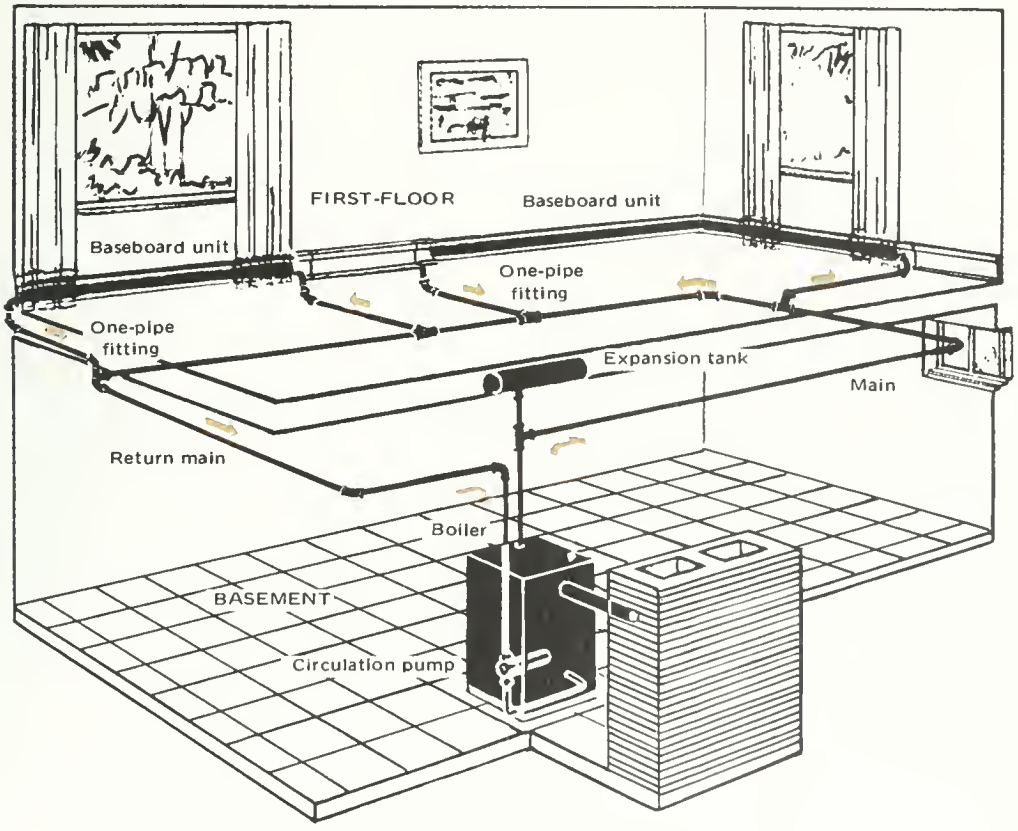
Basic fuel costs. So that you will not be taken in by adroit statistical juggling, learn how the *usable* energy content of each fuel can be figured in terms of local prices. The results will not tell the whole story, but they provide a cost base that can be adjusted to take into account such extras as maintenance service costs. The calculations are not difficult, as the following examples reveal. Just remember to use your local fuel prices which may be quite different from those used here.

An oil furnace in good operating condition should be from 60 percent to 85 percent efficient, so assume an efficiency factor of 70 percent. The heating value of No. 2 fuel oil is about 140,000 BTU per gallon. We will assume the oil costs 20.9¢ per gallon. To obtain one million BTU of gross heat value, you would need 7.14 gallons of oil (divide 1,000,000 by 140,000). To find the cost of oil required to generate one million BTU of *usable* heat, multiply the price per gallon by 7.14 and divide by .70, the efficiency factor:

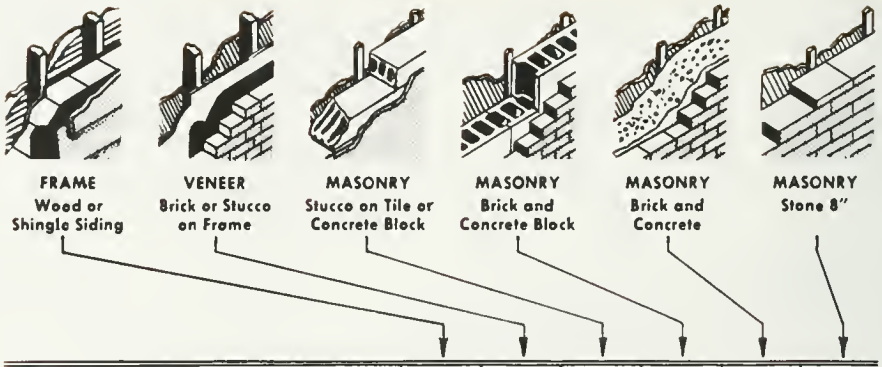
$$\frac{\$0.209 \times 7.14}{.70} = \$2.13$$

To calculate the relative cost of natural gas, assume a furnace efficiency of 70 percent as before, and a gas heat energy

In a forced hot-water system, water is heated in the boiler and forced through pipes to room heating units. Circulation of water is produced by a pump at the boiler.



FOR TYPICAL ONE-STORY HOUSE



Relative Fuel Bill of Home (without storm sash and insulation)	100	104	107	111	118	126
DESCRIPTION OF WEATHERPROOFING	NUMBER OF FUEL UNITS SAVED BY WEATHERPROOFING					
WINDOWS AND DOORS						
1. Weather stripping on all windows and doors	3	3	3	3	3	3
2. Storm sash and storm doors on all openings	12	12	12	12	12	12
3. Weather stripping plus storm sash and doors	12	12	12	12	12	12
CEILING INSULATION						
1. Insul. lath (1/2"). Attic not vented	9	9	9	9	9	9
2. Insul. lath (1"). Attic not vented	14	14	14	14	14	14
3. 1" insul. board over joist. Attic vented	12	12	12	12	12	12
4. 1" insul. board and 1/2" insul. lath. Attic vented	15	15	15	15	15	15
5. 2" blanket between joist. Attic vented	18	18	18	18	18	18
6. 4" flexible or fill between joist. Attic vented	22	22	22	22	22	22
WALL INSULATION						
1. Insul. board lath (1/2") with plaster	5	7	9	11	16	21
2. Insul. lath (1/2") with insul. sheathing 25/32"	8	10				
3. 1" blanket between stud or furring	9	12	15	18	25	31
4. 2" blanket between stud or furring	12	15	18	22	29	36
5. 3 5/8" flexible or fill between stud or furring	13	16	20	24	31	39

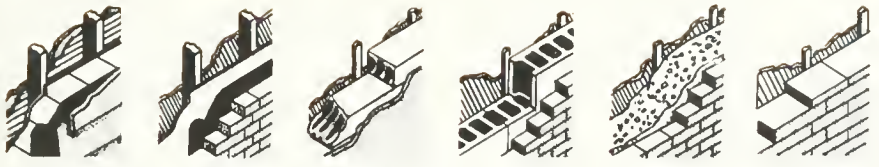
You are planning to build a one-story house with a brick veneer exterior wall with both insulation and storm sash. Relative fuel bill without these two is 104 units per year. Read down the column to the figure opposite "Storm Sash and Storm Doors." This figure, 12, represents the savings from 104 units, or about 11% of the fuel bill. If you also use a 4-inch flexible or fill ceiling insulation, you can add another 22 units to the previous 12 reducing your annual fuel bill by about 30%. Other combinations of savings can be derived from these charts, but you must limit your choice to only one from each subheading: Windows and Doors, Ceiling Insulation and Wall Insulation.

value between 1,000 and 1,200 BTU per cubic foot as indicated by your gas company (1,030 BTU is used in this example). Gas is priced on a sliding scale, so what you actually pay for heating depends on how much gas you also buy for other purposes such as cooking and clothes drying. Let's assume that you pay 13¢ per 100 cubic feet for heating. (Note: the gas company may quote a price per therm. One therm is enough fuel to generate 100,000 BTU *gross* heat, not considering furnace efficiency.) You would consume 971 cubic feet of gas to obtain one million gross BTU of energy (divide 1,000,000 by 1,030). To find the cost of one million BTU of *usable* heat, multiply the cost per cubic foot by 971 and divide by .70, the efficiency factor:

$$\frac{\$0.0013 \times 971}{.70} = \$1.80$$

Electric power is also sold on a sliding scale, and how much you use for other purposes determines the price you pay for

FOR TYPICAL TWO-STORY HOUSE



	FRAME Wood or Shingle Siding	VENEER Brick or Stucco on Frame	MASONRY Stucco on Tile or Concrete Block	MASONRY Brick and Concrete Block	MASONRY Brick and Concrete	MASONRY Stone 8"
Relative Fuel Bill of Home (without storm sash and insulation)	100	105	111	116	127	138
DESCRIPTION OF WEATHERPROOFING	NUMBER OF FUEL UNITS SAVED BY WEATHERPROOFING					
WINDOWS AND DOORS						
1. Weather stripping on all windows and doors	5	5	5	5	5	5
2. Storm sash and storm doors on all openings	18	18	18	18	18	18
3. Weather stripping plus storm sash and doors	18	18	18	18	18	18
CEILING INSULATION						
1. Insul. lath (1/2"). Attic not vented	6	6	6	6	6	6
2. Insul. lath (1"). Attic not vented	8	8	8	8	8	8
3. 1" insul. board over joist. Attic vented	7	7	7	7	7	7
4. 1" insul. board and 1/2" insul. lath. Attic vented	9	9	9	9	9	9
5. 2" blanket between joist. Attic vented	11	11	11	11	11	11
6. 4" flexible or fill between joist. Attic vented	13	13	13	13	13	13
WALL INSULATION						
1. Insul. board lath (1/2") with plaster	7	10	13	16	23	30
2. Insul. lath (1/2") with insul. sheathing 25/32"	12	16	—	—	—	—
3. 1" blanket between stud or furring	13	18	22	26	35	45
4. 2" blanket between stud or furring	18	23	28	32	43	53
5. 3 5/8" flexible or fill between stud or furring	19	24	30	35	45	56

heating. Let us assume that your electric power for heating costs 1.5¢ per kwh on the average. Each kilowatt-hour yields about 3,412 BTU of heat energy, hence one million BTU would require 293 kwh of electrical power (divide 1,000,000 by 3,412). In this case assume 100 percent efficiency because there is no loss up chimneys from radiant room heaters. To find the cost of one million BTU, just multiply the cost per kwh by 293:

$$\$0.015 \times 293 = \$4.395$$

Remember that you may come up with very different answers because the relative costs of gas, oil and electricity in your community may not be the same as in these examples. At best, such calculations are a starting point. You must add in such extra costs as operation of electric pumps and blowers in gas and oil systems, annual service and maintenance costs, and amortization of the initial equipment investment.

▲ *You are planning to build a two-story house with 8-inch stone walls. You have studied the various costs for different fuels in your area and picked one that will cost you $200. What insulation must be added to reduce this bill to $100 per year? The basic fuel bill for such a house is 138 units. To cut this by 50% you need to find a combination from the three sections (without choosing more than one from any section) which will total 69 units or more. Of the many combinations available, let's assume that you picked the following: storm sash, 18 units; 4-inch flexible or fill ceiling insulation, 13 units; and 1-inch blanket wall insulation, 45 units. Total: 76 units which is more than the required 69 to cut the bill in half.*

When figuring out the unit price of gas or electricity used for heating, you must base the rate on the quantities of fuel used after allowing for other uses of the same fuel. To complicate matters further, consider that you will use far less fuel in September than in mid-winter; thus you may be paying more for fuel used for heating in September than you will later in the season.

Heating Economy Rule No. 2. Do what you can to obtain the lowest possible rate on fuel used for heating. For example, if you heat with gas, it may be wise to also use gas for cooking, clothes drying, heating hot water, and other purposes.

Heating Economy Rule No. 3. Maintain your heating equipment at top efficiency. The annual investment for furnace clean-out and adjustment pays good dividends in lowered fuel consumption.

Heating Economy Rule No. 4. Make certain that your home is properly insulated. The importance of adequate insulation, in terms of heating economy, can hardly be exaggerated.

Heating Economy Rule No. 5. Avoid wasting expensive heat. You can do this in many ways. Make sure that your fireplace damper is closed at all times when the fireplace is not being used. Keep your garage doors closed, especially if the garage is underneath the house. Make certain that windows close properly. Avoid letting drapes hang over radiators or radiant heaters. Close drapes over large glass expanses at night to provide an additional heat-saving dead air space between the drapes and windows or sliding glass doors. Humidify your rooms during excessively dry periods; at proper humidity levels you need less heat to feel comfortable. Reduce heat levels in little-used rooms such as bedrooms and workshops. Close windows when ventilation is not needed.

You may realize savings by using two different kinds of heating systems. For example, you might use gas or oil heat for most of the house. Electric space heaters may be wholly adequate for basement or shop areas where supplemental heating is needed only now and then. If you add a new room to your home, the wing might better be heated with electricity because installation of a radiant heater and feeder line may be much cheaper than extending your main hot water or forced air system. In any case, be sure that extension of the existing heating system will not overtax the capacity of your heating plant.

Convenience factor. After you have cross-checked the relative costs of gas, oil and electric heating in your community, give plenty of thought to convenience and comfort offered by different types of heating systems. Suppose you lean toward a forced hot air system fueled with gas or oil. The same duct system can also be used for central air-conditioning, air filtration, humidification. If you now have a forced air system with good ductwork, but a shaky old furnace, you can even switch to electrical heating of the air and get rid of that bulky furnace and forget about that oil tank that needs constant refilling.

If you are one of those who dislike forced air, and therefore lean toward installation of a conventional hot water system, be sure you choose plumbing that is most efficient for a home of your type and size. The simplest plumbing consists of a pipe that leads from one radiator to the next. This is usually a poor choice because the last radiator in the line will be much cooler than the first. Much more popular is the one-pipe system having by-passes that feed each radiator. This type of system is a compromise between highest efficiency and economy of plumbing. Its only real disadvantage is that water discharged from each radiator goes back into the hot water line. Here again some radiators may run much hotter than others, although with proper planning the problem is not usually very serious. A two-pipe system is most ex-

This greatly simplified map shows why you cannot judge heating and insulation needs by latitude alone. For example, trace the 6,000 degree day line from Massachusetts to the state of Washington. Countless local variations exist within zones.

NORMAL EXPECTED FUEL CONSUMPTION

Percent of Heating Season Total

	Denver	Los Angeles	New Orleans	New York
Sept.	2%	-	-	1%
Oct.	8	3%	2%	5
Nov.	12	8	12	11
Dec.	17	16	25	18
Jan.	17	20	26	19
Feb.	15	17	21	18
Mar.	14	15	11	15
Apr.	9	11	3	9
May	5	8	-	3
June	1	2	-	1

This table shows how fuel consumption varies from month to month in different parts of the country. Unlike oil, gas and electricity are sold on sliding price scales; the price per unit becomes less as you use more. You probably pay more for the gas or electricity used for heating in the spring and fall than you do during winter months. Thus fuel cost estimates based solely on mid-winter usage could be misleading.

pensive to install, but it offers uniform heat in all radiators because the discharge from each radiator is fed to the second pipe for return to the furnace so that it does not mix with the hot feed water. Best for large, rambling homes.

Electric heating systems of course require no plumbing or ductwork, only cables that feed power to direct-resistance radiant heaters that take up no room space. You can choose heaters that look like baseboards, wall mounted units, or heater coils that are integrated into walls, ceiling or floors. (Electricity can also be used to fuel conventional hot water or forced air systems.) If you have never experienced radiant heat, visit a model home so equipped if you can before arbitrarily choosing this type of system. Good house insulation is a must with electrical heating systems.

Another type of electrical heating system worth considering, especially if you live where winters are mild, is the revolutionary *heat pump*. It operates much like a refrigerator. Heat extracted from the outdoor atmosphere (or from ground or water) is pumped into the home, even during zero weather. A big plus: you can reverse the process in the summer and use the heat pump for air conditioning.

Radiant heating offers a number of convenience advantages. Installation is usually cheaper than for gas or oil systems, and there are virtually no maintenance costs because there is no furnace, and no filters, fuel or water pressure tanks, pumps, valves, fans, chimneys, jets or other components requiring periodic maintenance or replacement. Finally, zone heating is a cinch with electric radiant heaters because you can have a separate thermostat for each room.

Fuel Supply Problems. It's one thing to make fuel cost comparisons based on today's prices for oil, gas and electricity; it's another thing to predict how their prices will compare five or ten years from now. All three industries are plagued by shortages, which means that inflationary pressures are bound to affect your heating bill no matter which fuel you use.

Some electric power companies boast that they have reduced electric rates several times during the past few years. The ex-

planation: to encourage home heating to make use of capacity built up to handle heavy summer time air conditioning demands. How long this trend will continue is anyone's guess.

Meanwhile the oil and gas industries are complaining about serious shortage problems—problems that can only be cured, they say, through increased prices. One gas company president has put it quite bluntly: "Natural gas is now a premium fuel, and the price will rise considerably." It's implied that commercial and industrial users will feel the cost pinch first. But it is not likely the homeowner consumer will be far behind.

There's not much that you, personally, can do about inflation. But you can give some thought to possible fuel delivery problems. For example, if you live in a rural area where heavy snows are common, you might run out of oil before a delivery can be made. And of course there is always the possibility of strikes by deliverymen. Since gas is piped directly to each home, strikes and storms are lesser threats. But pipelines do burst, and if a large community is affected resumption of service may take days. The reason: each gas-using home must be visited twice by servicemen; once to see that all appliances are cut off, and a second time to see that they are started up properly.

If you heat electrically, you may be left in the cold because of a power blackout, or because power lines have been damaged by a storm. Usually, restoration of electric service is fairly rapid, especially since a serviceman need not visit each home. Also, strikes are not likely to cut off your supply of electricity.

It should now be obvious that there is no quick, foolproof answer to the question: What is the best and most economical heating system for my home? There will be a great temptation to hand the problem over to an expert and rely on his judgment. But if you are truly interested in getting the most for your heating dollar you must do more than that. At the very least, you should talk with as many experts as possible, and as often as necessary, until you weed out at least the most flagrant contradictions. Play one against the other. After all, they all want your business. Make the winner earn it.

See also: HEATING SYSTEMS, HOME.

HEATING LANGUAGE

Convection heating. The heat source warms the room air which in turn transfers heat to your body and other objects. A forced hot air system heats by convection. A hot water radiator heats both by convection and radiation.

Radiant heating. The heat source warms your body and other objects *without* first warming the surrounding air. The sun provides radiant heat, as does an electric hot plate and light bulb. Prove this by placing your hand near a lighted bulb; turn the light off and notice how most of the heat "snaps off" along with the light. The slight residual heat is transferred by convection from the hot glass of the bulb.

Btu. Short for British thermal unit, a unit of measure expressing the quantity of heat generated or used.

Kw. Short for one kilowatt (1,000 watts) of electrical power.

Kwh. Short for kilowatt-hour, a value derived by multiplying watts by time in hours (or fractions of hours) and dividing by 1,000. This unit of measure not only tells how much electricity is being used but also for how long. One kilowatt-hour could be 1,000 watts generated or used over a period of one hour; or 2,000 watts used for one-half hour; or 500 watts used for two hours, etc.

How to Build a Cradle

This plywood cradle with convenient casters and a gentle rocking motion will easily match any decor

NURSERY FURNITURE no longer resembles drab, strictly utilitarian pieces they were not too long ago. Innovations in style and improved design make baby's things so much more attractive and practical. This baby's cradle has charm and beauty that will match the rest of the home's furnishings. And the rocking is ever so relaxing for the baby.

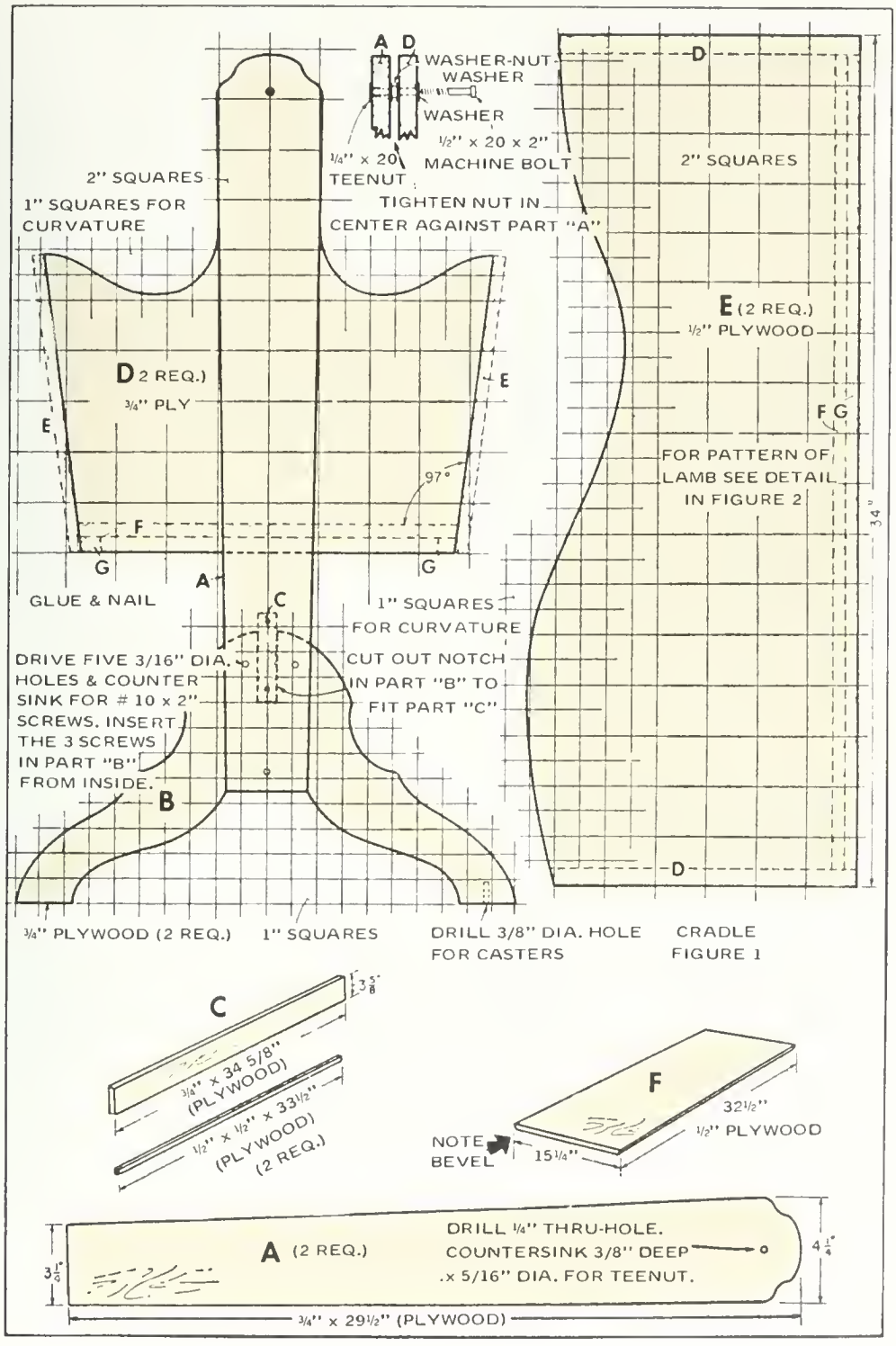
The cradle is made of birch plywood, but you can select any other from the dozens of natural wood grains that may strike your fancy. It is equipped with casters for easy rolling from one room to another and the sketches and instructions given here will make it quite easy for you to build the cradle. The dimensions given will accommodate a regular baby mattress, which can be purchased at any nursery furniture store. The little lamb design makes a cute decoration and is very easy to create.

Before starting the project, outline the patterns from the sketch on heavy kraft paper, ruled with 1-inch and 2-inch squares, as needed. These patterns will be for parts A, B, D, and E. You will need a pair of each of these parts, all cut from ¾-inch plywood. Select portions of the plywood providing similar grain for each part. Cut out the patterns and trace the outlines directly onto the plywood, then turn the pattern over to obtain the duplicate part with the best surface of the plywood on the outside. Plywood that is sold as "good both sides" will be a worthwhile, slightly extra expense as all surfaces will then be equally attractive.

Cut the pieces with a bayonet saw, or on a band or jig saw. The pieces may be cut separately, or together by joining the wood stock temporarily so the design curves will be uniform. In any event, even if cut separately, the duplicate parts can be clamped together and the edges smoothed down with a rasp, or just sandpaper if there is not much distortion of the pattern.

Drill countersunk holes in parts A and B, as indicated, for the ¼ x 20 teenuts.

furniture from crates: see lumber
furniture hardware: see cabinets


A D
WASHER-NUT
WASHER
WASHER
1/2" x 20 x 2"
MACHINE BOLT
1/4" x 20
TEENUT
TIGHTEN NUT IN
CENTER AGAINST PART "A"
2" SQUARES
1" SQUARES FOR
CURVATURE
D 2 REQ.)
3/4" PLY
E
F
G
97°
GLUE & NAIL
A
C
DRIVE FIVE 3/16" DIA.
HOLES & COUNTER
SINK FOR # 10 x 2"
SCREWS. INSERT
THE 3 SCREWS
IN PART "B"
FROM INSIDE.
B
1" SQUARES
FOR CURVATURE
CUT OUT NOTCH
IN PART "B" TO
FIT PART "C"
D
2" SQUARES
E (2 REQ.)
1/2" PLYWOOD
F G
FOR PATTERN OF
LAMB SEE DETAIL
IN FIGURE 2
34"
3/4" PLYWOOD (2 REQ.)
1" SQUARES
DRILL 3/8" DIA. HOLE
FOR CASTERS
CRADLE
FIGURE 1
C
3 5/8"
3/4" x 34 5/8"
(PLYWOOD)
1/2" x 1/2" x 33 1/2"
(PLYWOOD)
(2 REQ.)
F
32 1/2"
1/2" PLYWOOD
NOTE
BEVEL
15 1/4"
A (2 REQ.)
DRILL 1/4" THRU-HOLE.
COUNTERSINK 3/8" DEEP
.x 5/16" DIA. FOR TEENUT.
3 1/8"
4 1/4"
3/4" x 29 1/2" (PLYWOOD)

First drill halfway through with a 5/16-inch bit, then go all the way through with a ¼-inch bit to provide the recessed depth.

A slot is cut in each B part to a size of ¾ x 3⅝ inches. This is to receive the C stretcher piece between the part B legs, as shown on plan. Join parts A and B with glue and screws to form the two leg and vertical pairs. Cut part C, from ¾-inch plywood, to 3⅝ x 34⅝-inch size. Fit the part C stretcher between the two part B legs. The stretcher should fit snug into the slots, and is to be fastened with glue and screws.

Cut two part G cleats from ½-inch plywood or solid stock, to a ½ x 33½-inch size. These cleats are glued and nailed along the bottom edge of sides E to hold the cradle bottom, which is part F. The 2d nails are driven at an angle to avoid having them come through the outer surface of the sides.

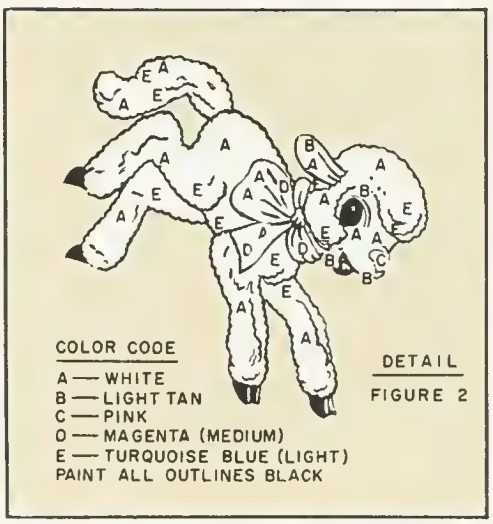
Assemble parts D (the cradle ends) with the sides, using glue and 3d finishing nails. Next, the bottom is cut to the actual measurement of the space, 15¼ x 32½-inch, from ½-inch plywood which is cut with a bevel edge to fit the sloped interior. The bottom panel is glued directly to the supporting cleats, parts G.

Suspend the cradle between the vertical posts, as described previously, by inserting the teenut bolts in the A and D holes. This completes the assembly. The cradle can be fitted with a standard size carriage or bassinet mattress. Casters may be added for rolling the cradle around by drilling stem holes into the bottom of the legs.

The decorative lamb sketch may be duplicated on the piece of ¼-inch plywood. It is first painted white for background. Outline the figure in pencil, then fill in with the colors indicated in the sketch. When dry, saw out the figure with a coping saw or saber saw, and attach to the sides with brads.

Original design by Steve Ellingson.

See also: FINISHING, WOOD; WOODWORKING.



DETAIL
FIGURE 2

MATERIALS LIST

Quantity	Size and Description	Purpose
1	¾" 4'x4' hardwood veneer plywood	parts A, B, C and D
1	½" 3'x3' hardwood veneer plywood	parts E, F and G
1	¼" 1'x2' hardwood plywood	decorative lamb
as needed	#10 2" flat head wood screws	
as needed	#10 1¼" flat head wood screws	
	¼x20 2" machine bolts with washers and nuts	
	¼x20 teenuts	

NOTE: Also need 2d and 3d finishing nails, glue, finishing stain or enamel.

Build a Child's Footlocker

Two capacious drawers add to the convenience of this bench designed to fit at the foot of a child's bed

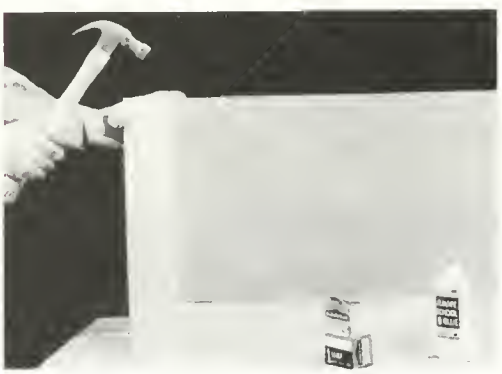
YOU NEED NO LATHE or other specialized tools to make this attractive child's footlocker. The spindles are assembled from stock items and, except for a few scroll cuts made with a saber saw, every bit of the construction can be done with ordinary hand tools.

The combination of solid lumber and plywood used in construction eliminates the problems that often confront the home craftsman. Wide flat boards are hard to come by in solid lumber, except perhaps for knotty pine which is not suitable in this case. One solution is to use plywood which is available in many types of wood and in several thicknesses. Birch was selected for the child's footlocker illustrated. It has a lovely grain and is smooth, close grained, and easy to finish.

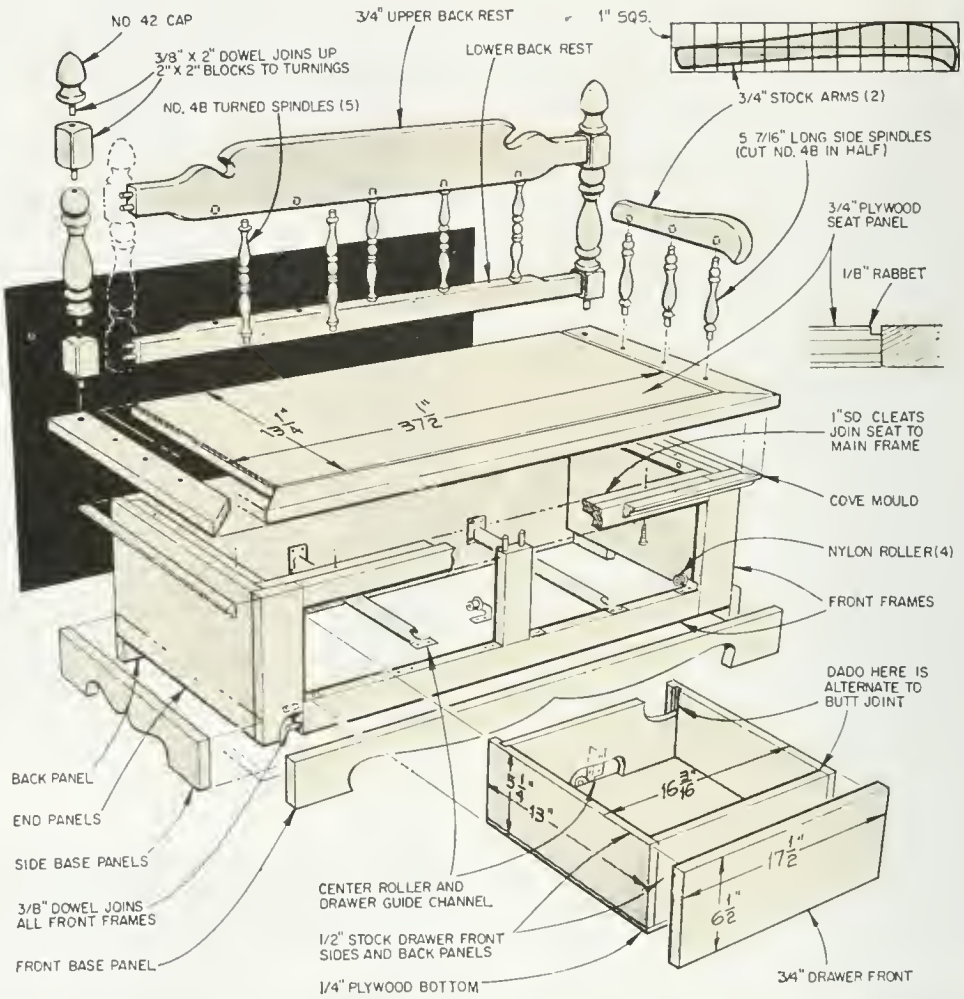
The problem with using plywood, however, is the edge grain which is unsightly and difficult to finish. You can use solid lumber to edge the plywood, thus eliminating the second problem. A good wood to use for edge work is poplar. It, too, has an excellent grain pattern, is close grained and is easy to work.

Assembly is accomplished with screws, dowels, nails and glue. Cut all sections to size, check for proper fit, then assemble as shown in the photographs. The edging for the seat section is mitered and assembled with dowel pins. If you cut the miters by

Frame of the footlocker seat is cut from 3/4-inch poplar. Miter the corners and assemble with dowels and glue.

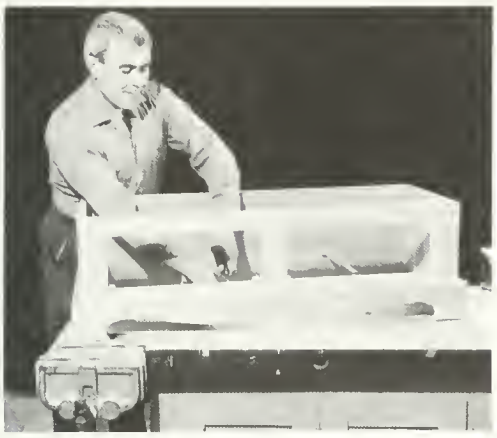


Nails and dowels are used to attach the poplar frame to birch plywood seat. If available, clamps will prove very helpful.


NO 42 CAP
3/8" X 2" DOWEL JOINS UP 2" X 2" BLOCKS TO TURNINGS
NO. 4B TURNED SPINDLES (5)
3/4" UPPER BACK REST
LOWER BACK REST
1" SQS.
3/4" STOCK ARMS (2)
5 7/16" LONG SIDE SPINDLES (CUT NO. 4B IN HALF)
3/4" PLYWOOD SEAT PANEL
1/8" RABBET
1"SQ CLEATS JOIN SEAT TO MAIN FRAME
COVE MOULD
NYLON ROLLER(4)
FRONT FRAMES
DADO HERE IS ALTERNATE TO BUTT JOINT
BACK PANEL
END PANELS
SIDE BASE PANELS
3/8" DOWEL JOINS ALL FRONT FRAMES
FRONT BASE PANEL
CENTER ROLLER AND DRAWER GUIDE CHANNEL
1/2" STOCK DRAWER FRONT SIDES AND BACK PANELS
1/4" PLYWOOD BOTTOM
3/4" DRAWER FRONT

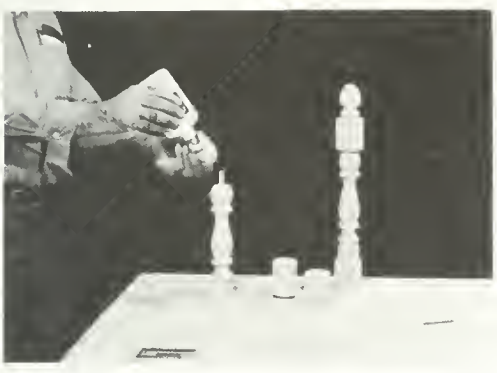
▲ *Cleats are attached to underside of the footlocker's seat with nails and glue. Note dimensions in the Materials List.*

▲ *Poplar front framing is dowelled, as shown. Before assembly, lay pieces on a flat table and sand joints until flat and smooth.*

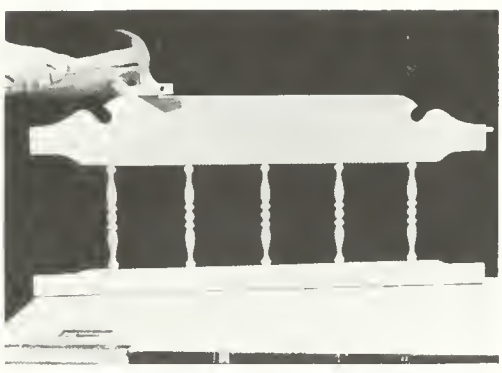


Base section is fastened to the main section with screws. Note the single-track drawer slide hardware.

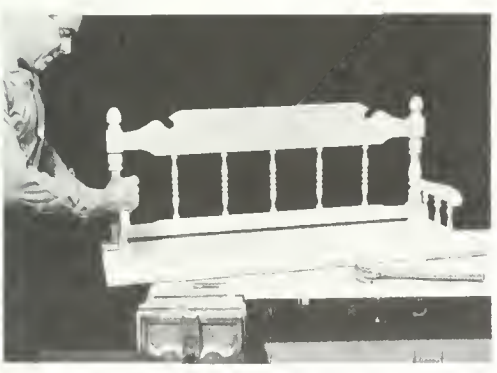
Drawer construction is greatly simplified by the use of false fronts. The drawer is completed first, then false front added.



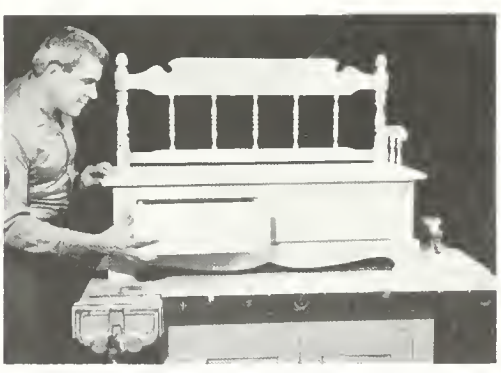
No lathe needed here—corner posts are made up by combining two ready-made turnings with square maple blocks, as shown.



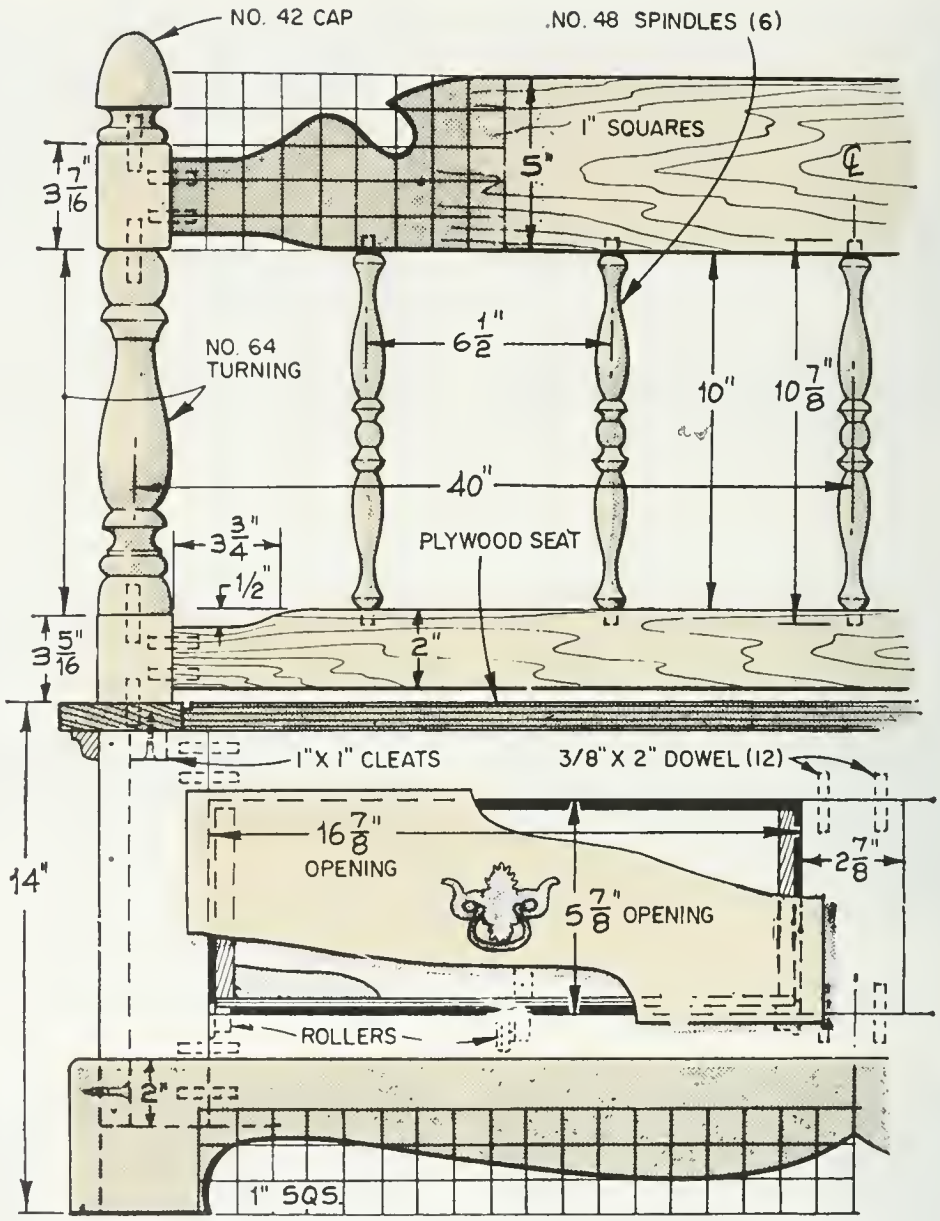
Back piece is drilled to accept spindles. Scrap under hammer prevents damage. Seat back and arm rest spindles are stock items.



For the arm rests, the spindles are cut in half. You will have to whittle their ends to fit the holes drilled into the seat.



Drawer must be made with proper allowance for the drawer hardware used. Therefore, obtain hardware before you make drawers.



hand be sure they are straight and square. Plywood is also used for the end panels. Cut the pieces so the grain runs vertically.

The front framing is cut from poplar and dowelled as shown. Before assembling, lay pieces on a flat table and sand until all joints are flat and smooth. Assemble to the side panels with glue and a couple of nails. Place the nails at the ends where they will be hidden by the base and upper moldings. For added strength, use corner glue blocks on the inside corners.

The turned corner posts are made up by combining two ready-made turnings and

square maple blocks. The squares are cut from a length of maple base block. The ends are rounded by using a file and following up with sandpaper. Assemble with dowels and white glue. Ordinary dowels may be used, but grooved dowel pins are best as they will retain the glue better.

The spindles for the seat back and arm rests are also stock items. For the arm rests, the spindles are cut in half. The cut end of the spindles will have to be whittled so they will fit the holes drilled into the seat. Refer to the drawing.

The drawers are made of ½-inch lumber with ¼-inch plywood bottoms and ¾-inch false fronts are added to the drawers. This greatly simplifies construction and eliminates the need for shaping and undercutting. Single track drawer hardware is recommended.

The base is cut to shape then assembled by means of screws from the inside. Likewise, the seat is assembled to the side, rear and front by means of cleats and round head screws.

After assembly, sand smooth then stain and finish as desired.

Original design by Steve Ellingson.

See also: FINISHING, WOOD; WOODWORKING.

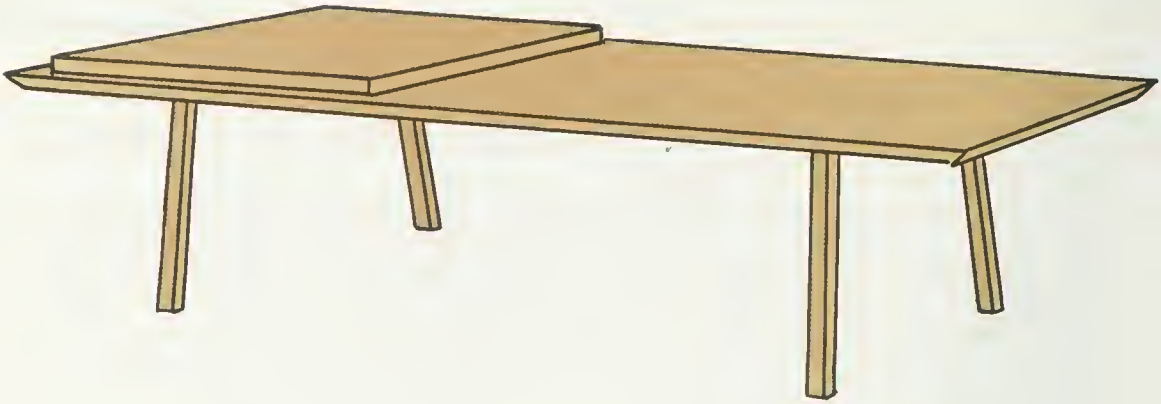
WHERE TO FIND IT

Corner turnings and spindles, if not available from your lumber dealer, can be ordered from the Armor Company, Box 290, Deer Park, N.Y. 11729.

MATERIALS LIST

Quantity	Size and Description	Purpose
1	3/4" 5"x38" poplar	upper back rest
1	3/4" 2"x38" poplar	lower back rest
2	3/4" 2"x12" poplar	arm rests
6	5 7/16" spindles	side
5	10 7/8" spindles	rear
2	3/4" 3 1/2"x16 3/4" poplar	seat sides
1	3/4" 3 1/2"x44 1/2" poplar	seat front
1	3/4" 13 1/4"x37 1/2" lumber core birch	seat
2	3/4" 11"x15" lumber core birch	ends
2	3/4" 3"x11" poplar	front frame ends
1	3/4" 2 7/8"x5 7/8" poplar	front frame center divider
1	3/4" 2"x35 3/4" poplar	front frame top
1	3/4" 3 1/8"x35 3/4" poplar	front frame bottom
1	3/4" 4 1/4"x43 1/4" poplar	front base
2	3/4" 4 1/4"x15 3/4" poplar	side base
2	3/4" 6 1/2"x17 1/4" poplar	drawer front
4	1/2" 5 1/4"x15 3/16" poplar	drawer panels
4	1/2" 5 1/4"x13" poplar	drawer panels
1	3/4" 13 3/16"x40 1/4" plywood	back
2	1/4" 13"x16 3/16" plywood	drawer bottoms

NOTE: Also need corner post assembly, dowels, cleats, nails, screws, drawer slides and pulls.



Contemporary Coffee Table

This table requires no more than an evening to build and will look ideal in front of a picture window

HERE IS A SIMPLE bench-coffee table that will fit into a contemporary or a modern setting. The large surface of natural wood is supported by iron legs. It will be ideal in front of a picture window, with a green plant and a ceramic ashtray or two. Then, with the addition of a pillow or a flat foam rubber cushion, the table becomes a seating unit for extra company.

This table will require no more than one evening to make the five parts, plus a few scattered hours to finish, varnish, paint, and assemble. The materials needed are one lumber-core birch plywood or solid birch panel ¾ x 18 x 60 inches (with one good face), 80 linear inches of $\frac{7}{16}$- or ½-inch square iron rod to be hacksawed into two equal lengths for the legs, four large washers 1 to 1¼-inches in diameter with rather small holes, a half dozen #10 x 1-inch flat head wood screws, and four #10 x 32 flat head machine screws ½-inch long.

Make the wood panel first. Square up the corners and mark the bevel lines on the reverse side of the panel ¾-inch in from the edges. On the four edges mark lines ¼-inch from the top surface of the panel. Put the panel face down on a cloth cover and carefully plane to the bevel lines. If you have a circular saw, set it to cut the bevel at an angle of approximately 36°.

Round the edges with plane and sandpaper. Sand the entire surface with fine sandpaper. Dust the panel and apply a thinned coat of satin finish varnish to fill the wood and, when dry, sand lightly. Use one part turpentine to two parts varnish for the thinned coat. Apply two more coats of satin finish varnish and finally smooth surface with 3/0 steel wool or pumice and linseed oil.

For the legs, clamp the two pieces of iron rod in your vise and heat the bend points with a blow torch until cherry red. Bend the legs and allow to cool to room temperature. A template of the leg angle cut from a tin can will help your accuracy.

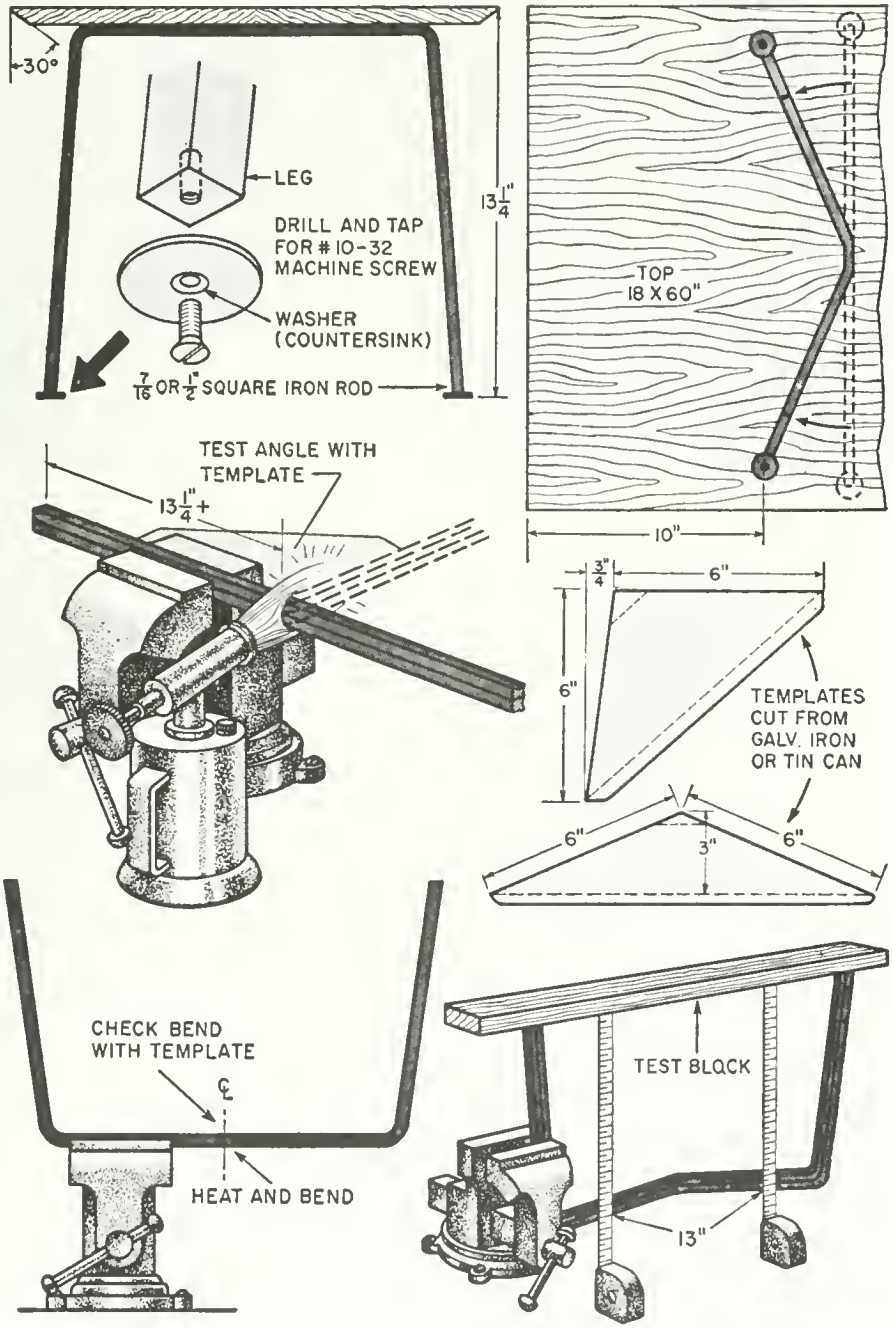
After all four legs are bent, one flat U-shaped piece is clamped in the vise. Heat the center portion of the U and make the horizontal bend which will add rigidity to the legs. Instead of two pairs of legs, the four legs can be made separately and secured individually using three screws in each leg, thus reducing the bending to a minimum.

Drill and countersink three holes in each set of double legs for the #10 screws. Clamp the two sets of legs together in the vise, file the ends so that all the legs are even and parallel to the top of the table.

Drill about ¾-inch deep into the bottom

of each leg perpendicular to the filed surface and tap for the #10 x 32 machine screws to hold the washers. The washer holes in turn are countersunk to receive the head of the machine screws. Be sure the head is completely below the surface of the washer so it will not scratch the floor. Securing the washer pads will be simplified if you can weld or braze them on the legs. D.M.S.

See also: TABLES.



Modular Entertainment Center

Build the various units of this modern, functional piece as needed to provide shelf areas, storage and space for your hi-fi

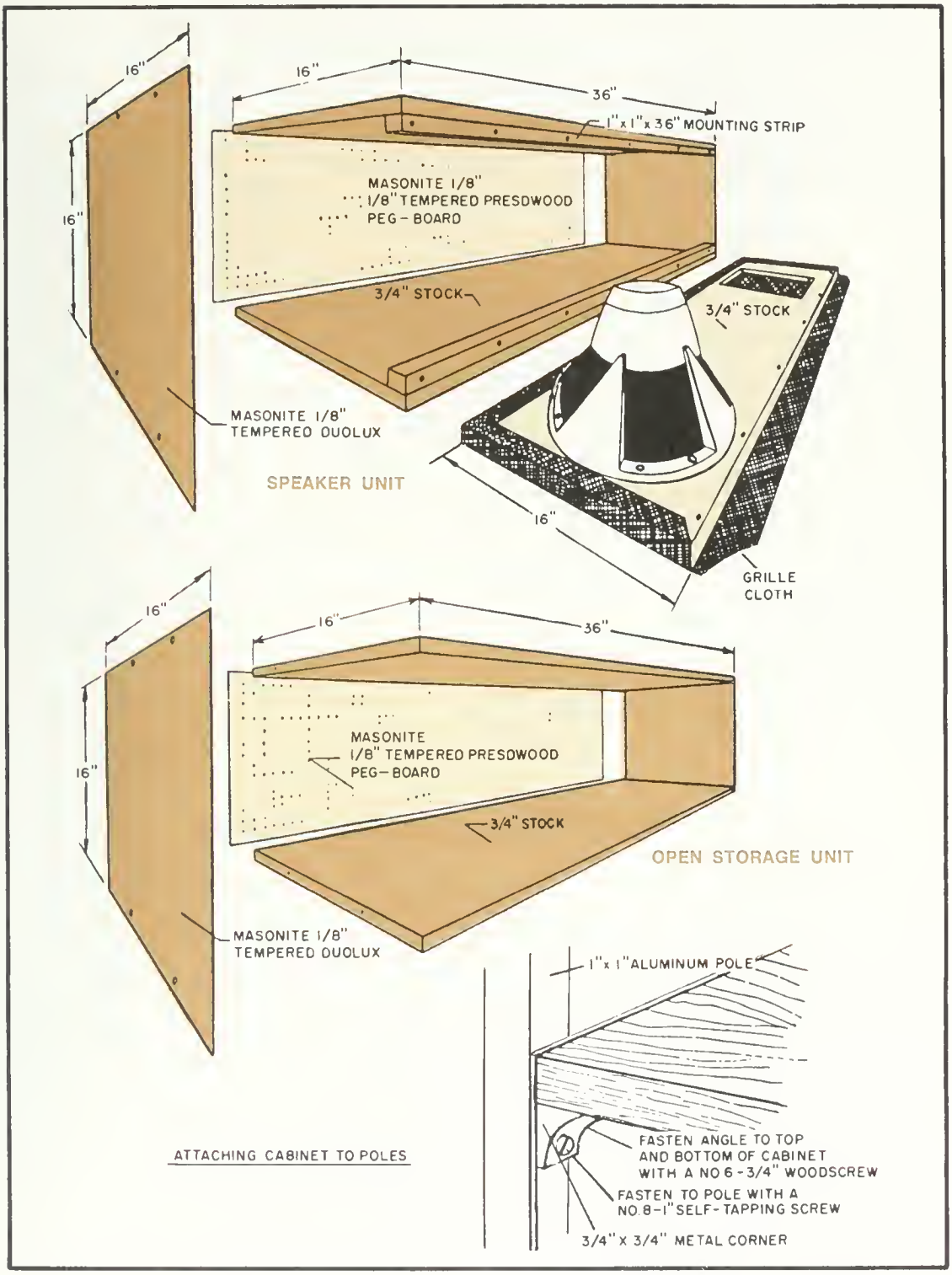
WHETHER YOU PREFER traditional or modern furniture, this unique, well designed, modular entertainment center will look completely at home in any setting. It is easily adaptable to fit your needs and space requirements.

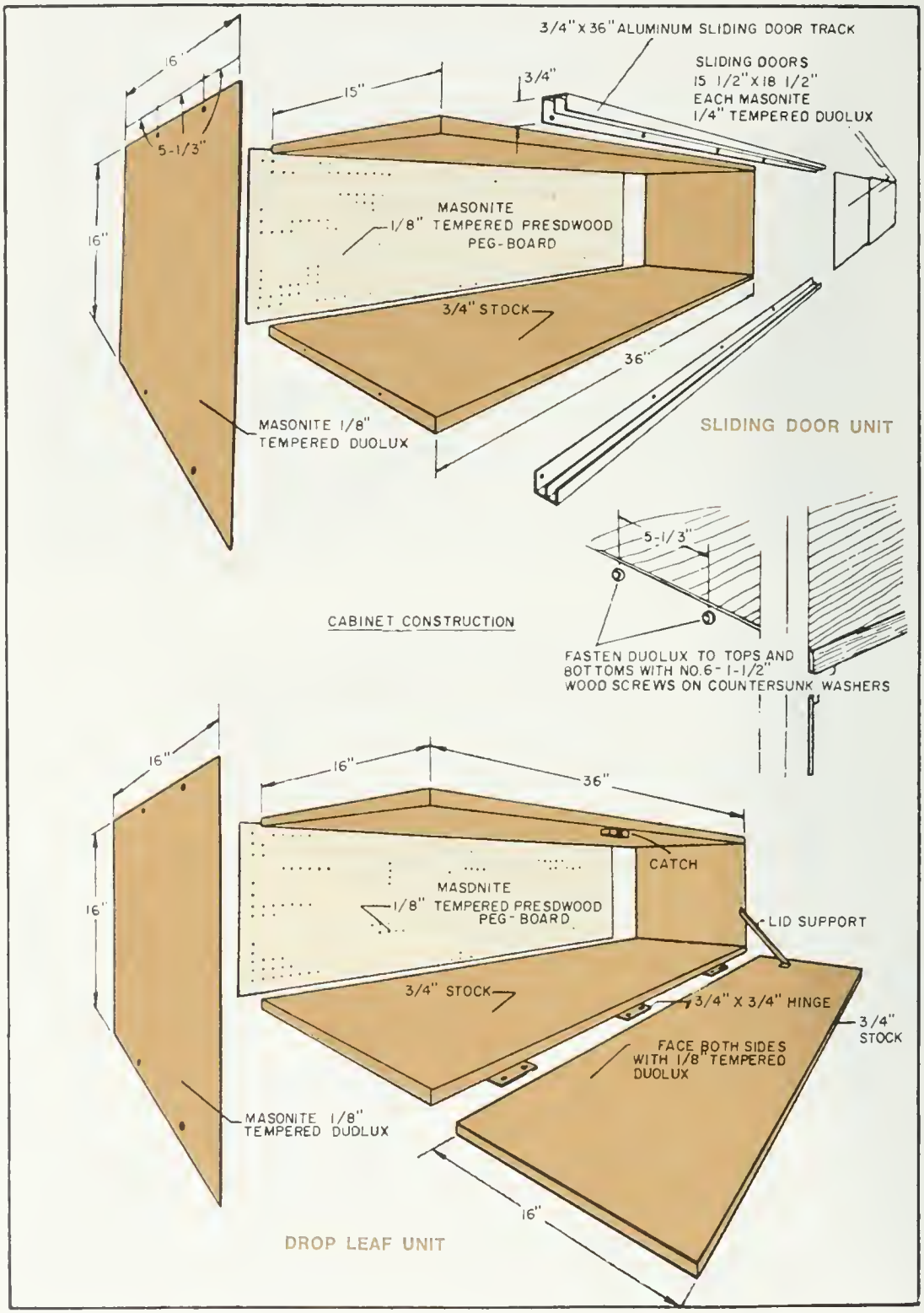
This system enables you to mount cabinets and shelves in any pattern on strong, slender poles. Each cabinet has a pegboard back panel which, when fitted with shelf fixtures, provides an excellent support for tuners, amplifiers and other components. Cabinets also house speakers and turntable and provide unlimited storage space for records and books. There is also space for a portable television.

The entertainment center is the answer to your problems in clean, uncluttered lines.

The arrangement shown is offered as a suggestion. You may have as many sections and cabinets as you need. Here are some of the many ways the unit can be used: as a divider wall, as shelving for books or art, as a partition with pass-through from kitchen to dining area, as a movie and still-photo closet, as a coat closet with sliding doors, as a floral cabinet. However and wherever you use it, in the living room, music room, den or as a room divider, you will delight in its usefulness and simple elegance.

The correlated group has been designed on a modular basis; that is, you can readily build as much or as little as space permits. It is flexible in that you can rearrange the various cabinets in the pattern you wish.


16"
16"
16"
36"
1"x1"x36" MOUNTING STRIP
MASONITE 1/8"
1/8" TEMPERED PRESDWOOD
PEG-BOARD
3/4" STOCK
3/4" STOCK
MASONITE 1/8"
TEMPERED DUOLUX
SPEAKER UNIT
16"
GRILLE
CLOTH
16"
16"
36"
16"
MASONITE
1/8" TEMPERED PRESDWOOD
PEG-BOARD
3/4" STOCK
OPEN STORAGE UNIT
MASONITE 1/8"
TEMPERED DUOLUX
1"x1"ALUMINUM POLE
FASTEN ANGLE TO TOP
AND BOTTOM OF CABINET
WITH A NO 6-3/4" WOODSCREW
FASTEN TO POLE WITH A
NO.8-1" SELF-TAPPING SCREW
3/4"x3/4" METAL CORNER
ATTACHING CABINET TO POLES


3/4" X 36" ALUMINUM SLIDING DOOR TRACK
SLIDING DOORS
15 1/2" X 18 1/2"
EACH MASONITE
1/4" TEMPERED DUOLUX
16"
5-1/3"
15"
3/4"
MASONITE
1/8" TEMPERED PRESDWOOD
PEG-BOARD
16"
3/4" STOCK
36"
MASONITE 1/8"
TEMPERED DUOLUX
SLIDING DOOR UNIT
5-1/3"
CABINET CONSTRUCTION
FASTEN DUOLUX TO TOPS AND
BOTTOMS WITH NO.6 - 1-1/2"
WOOD SCREWS ON COUNTERSUNK WASHERS
16"
16"
36"
CATCH
MASONITE
1/8" TEMPERED PRESDWOOD
PEG-BOARD
LID SUPPORT
16"
3/4" STOCK
3/4" X 3/4" HINGE
3/4"
STOCK
FACE BOTH SIDES
WITH 1/8" TEMPERED
DUOLUX
MASONITE 1/8"
TEMPERED DUDLUX
16"
DROP LEAF UNIT

Modular Entertainment Center

Basic cabinet construction. Each individual cabinet utilizes solid wood stock tops and bottoms with Masonite Tempered Duolux end panels and Peg-Board backs. Cabinet fastening is accomplished by edge screwing into the solid wood stock with #6 x 1½-inch chrome plated wood screws and chrome plated countersunk washers spaced six inches.

Typical modular dimensions are indicated on plans. For variation in sliding door track, change the side panel depth.

Speaker cabinet construction. This unit adds the speaker baffle and two mounting strips to the basic construction. Two openings are cut in the baffle plate. One opening, for the speaker, is cut 1¼ inches smaller than the outside radius of the speaker. The other opening, a bass reflex port, should be a rectangular opening approximately half the size of the speaker opening. Cover the baffle plate with cane, wire cloth or speaker cloth. Attach the baffle plate to the cabinet from the inside with #6 x 1½-inch wood screws through the mounting strips 12 inches O.C. Cover the inside of the speaker cabinet with a blanket-type insulation.

Drop-leaf cabinet, shelves and supports. The drop-leaf cabinet follows basic cabinet construction with the addition of a door constructed of ¾-inch solid lumber or plywood measuring 16 x 36 inches. Face both sides of the door with ⅛-inch Presdwood, fastened to the lumber with contact cement.

Shelf units are of ¾-inch solid lumber or plywood faced with Tempered Presdwood.

One inch square aluminum poles are used as supports for these cabinets. Cut poles to one inch below ceiling height and place an adjustable leveler on the top of each pole. Pre-drill mounting holes in cabinets and aluminum poles. The cabinets are attached to the aluminum poles with #8 x 1-inch self-tapping screws in each cabinet corner. After the group is completely set up, adjust the levelers tightly against the ceiling to make the unit solid. Shelves are attached to the poles by the use of metal corners attached to the bottom of each shelf with #6 x ¾-inch wood screws and into the poles with #8 x 1-inch self-tapping screws.

Finishing. The cabinets and shelves may be finished in a variety of ways, from wood veneers to painting. An attractive finish can be accomplished by veneering all exposed ¾-inch wood stock with a suitable veneer and finishing the sides and door fronts with a complementary colored lacquer or enamel. In general, finish the surface of Presdwood as you would ordinary wood. A good primer or sealer coat is most important. Then follow with one or two coats of a good grade lacquer or enamel.

See also: SHELVES; STORAGE.

Cabinet for All Your Sewing Needs

This easy-to-build, compact wood-grain unit will house your sewing machine and has ample storage space for your sewing supplies

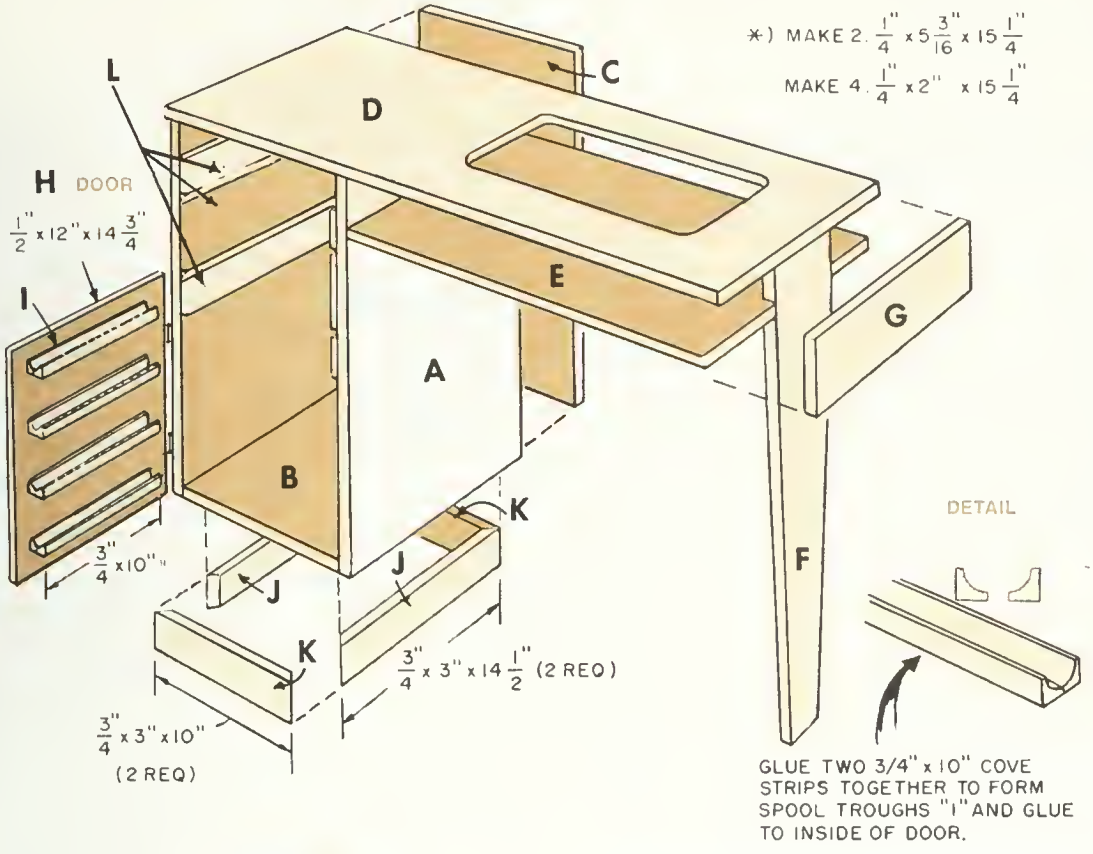
THIS SEWING CABINET was designed to hold a portable sewing machine, plus all the usual sewing supplies. The machine is housed in an easy-to-reach compartment when not in use, and the cabinet then can serve as a comfortable desk or buffet. The two regular-type drawers on the side may be used for sewing articles, while the shallow center drawer under the top can serve as storage space for stationery and similar items.

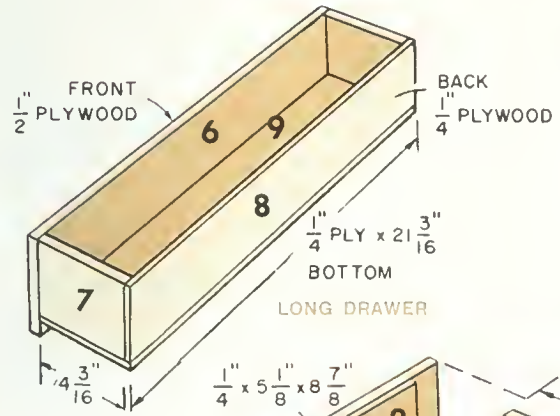
The parts needed are laid out on the plywood panels as shown in the drawing, so that there will be minimum waste. Single cuts can often serve for two or more parts to speed the project. As most of the parts require only straight cuts, the work is laid out in a manner that provides the best side of the plywood for the different matching parts. Thus it will not be necessary to reverse the pattern. Mark each part with letters on a piece of Scotch tape or label for identification. Sizes are shown in the drawing.

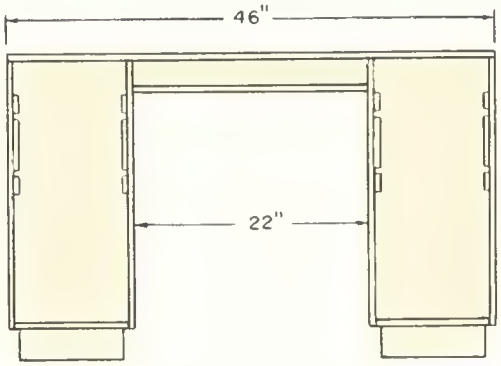
After cutting the parts, assemble the cabinet base unit by joining the two sides (A) to the back (C) and the bottom (B) with glue and counter finishing nails.

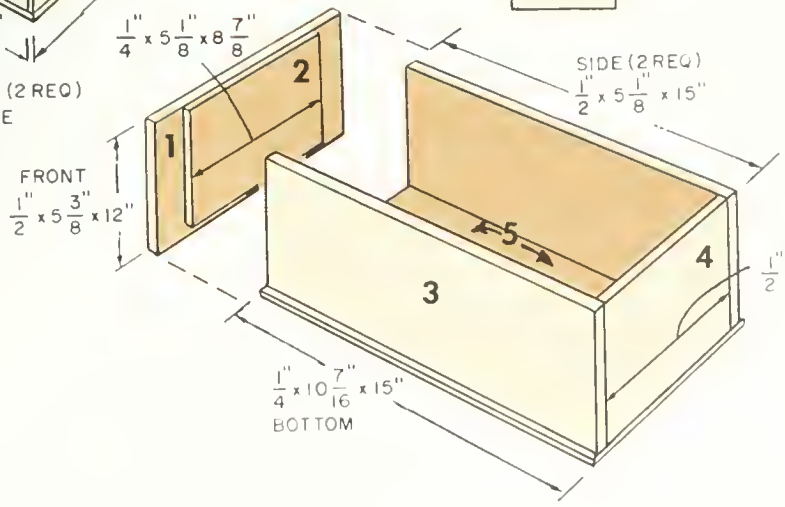
Form the recessed base from parts J and K, which have mitered ends. This boxlike assembly is set under the base cabinet so that there is a recess of about one inch all around. Attach to the base cabinet with finishing nails and glue.

Cut parts D, E, and F to dimensions given in drawing. In the top, trace the outline of your portable sewing machine and make the necessary cutout with a saber saw. In arranging the machine on the top, locate it five inches away from the front of the cabinet. The machine base drops down into the shaped cutout so that the working surface is flush with the cabinet top. The base is supported by the shelf underneath.

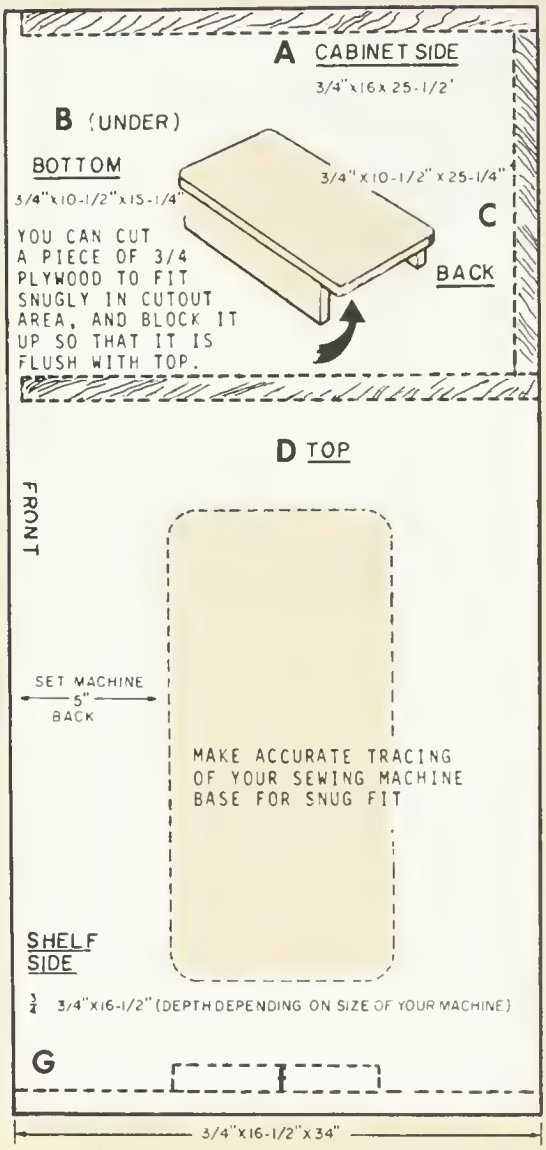


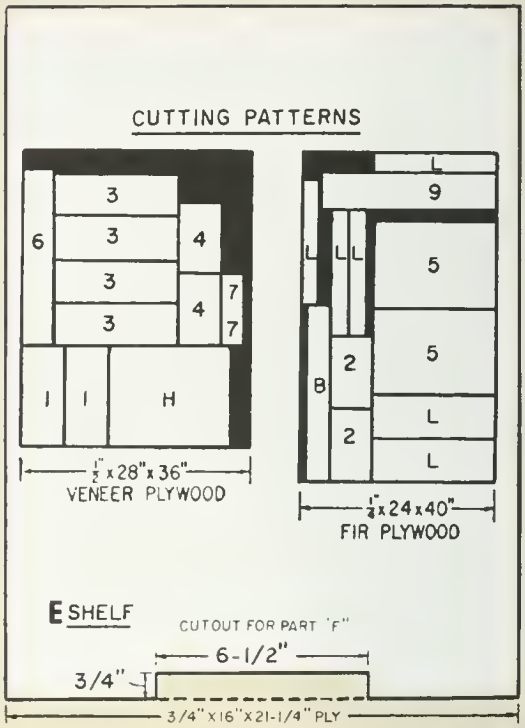


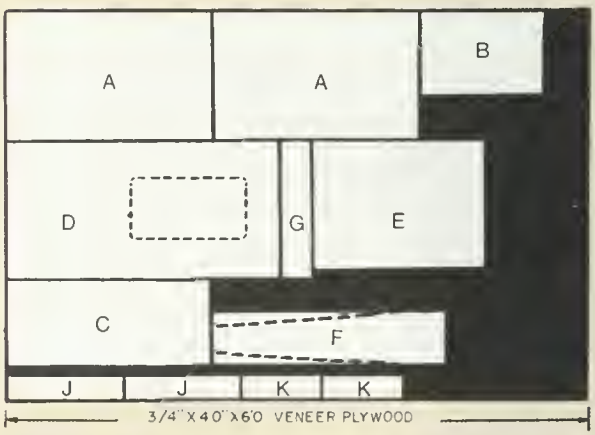


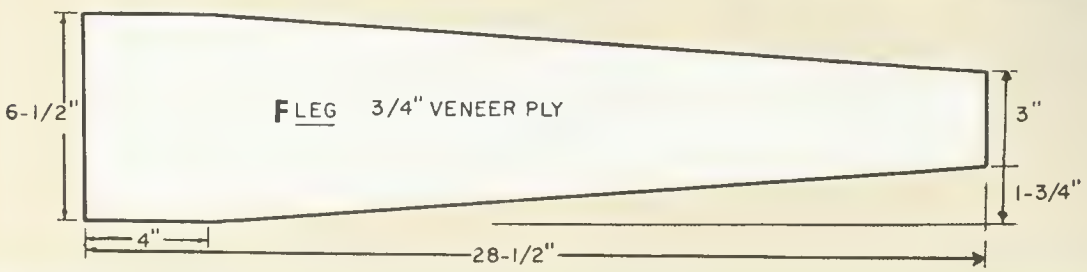


SEWING MACHINE CABINET


A CABINET SIDE
3/4"x16x25-1/2"
B (UNDER)
BOTTOM
3/4"x10-1/2"x15-1/4"
3/4"x10-1/2"x25-1/4"
C
BACK
YOU CAN CUT A PIECE OF 3/4 PLYWOOD TO FIT SNUGLY IN CUTOUT AREA, AND BLOCK IT UP SO THAT IT IS FLUSH WITH TOP.
D TOP
FRONT
SET MACHINE
5"
BACK
MAKE ACCURATE TRACING OF YOUR SEWING MACHINE BASE FOR SNUG FIT
SHELF SIDE
1/2 3/4"x16-1/2" (DEPTH DEPENDING ON SIZE OF YOUR MACHINE)
G
3/4"x16-1/2"x34"


CUTTING PATTERNS
3
3
3
3
6
4
4
7
7
I
I
H
1/2"x28"x36"
VENEER PLYWOOD
L
9
L
L
L
5
B
2
5
2
L
L
1/4"x24x40"
FIR PLYWOOD
E SHELF
CUTOUT FOR PART 'F'
6-1/2"
3/4"
3/4"x16"x21-1/4" PLY


A
A
B
D
G
E
C
F
J
J
K
K
3/4"x40"x60 VENEER PLYWOOD


6-1/2"
F LEG 3/4" VENEER PLY
3"
1-3/4"
4"
28-1/2"

Now join the top to the cabinet base, again using glue and finishing nails. Always countersink the nailheads so the holes can be packed with wood putty. Add the leg, F, which fits into the notch cut into the shelf E. Note that the shelf E is located below the top at a height that enables it to support the sewing machine base. As the bases differ on various makes of machines, measure the actual depth of the base and position the shelf accordingly. Now join the leg to the edge of this shelf, and add the end section, part G.

When the sewing machine is not in use and is stored in the cabinet base compartment, the top may be used as a desk or for some other purpose. But this requires filling the cutout space in the top with a piece of plywood that is shaped to fit the opening. (The original piece that had been removed may be a bit too small because of the saw kerf, but you can overcome this by banding the edge with a thin plywood edge trim veneer.)

In order to support the top insert, attach blocking strips to the insert on two sides, cut to the required width so that the insert is held securely and flush with the top. It is a good idea to cover the insert with a desk blotter. The details of this insert support are shown in the drawing.

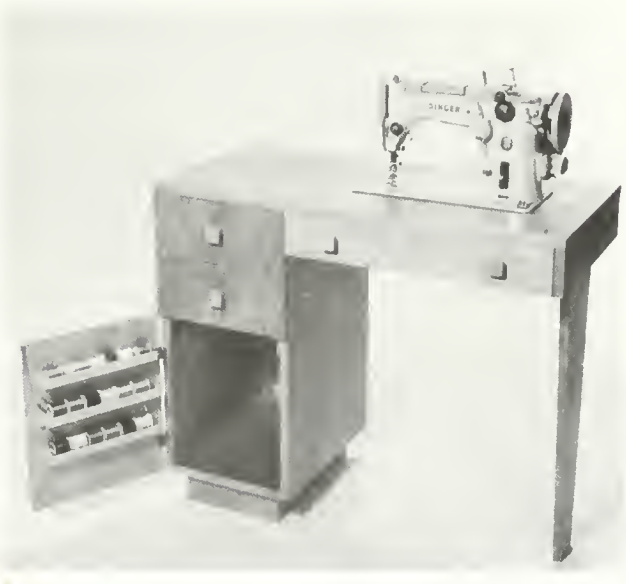
At this stage, you can see that everything has gone together simply and neatly. With the veneer strips, trim the exposed edges of the plywood. The rest of the project involves making the drawers, the compartment door, and spool holders, as shown.

The drawer construction details and dimensions are provided. The drawer fronts are made of a built-up thickness, the outside being of ½-inch plywood with a smaller piece of ¼-inch plywood glued to it so that there is a rabbet-type recess. Drawer bottoms are of ¼-inch plywood, securely attached.

The spool troughs are made by joining double strips of cove molding, ¾ x 10-inch, glued to the inside of the door. Attach the door with two butt-type cabinet hinges, add the drawer pulls, and the cabinet is ready for finishing.

Original design by Steve Ellingson.

See also: CABINETS; DRAWERS; WOODWORKING.



Thread spools are stored in troughs formed by gluing cove molding to inside of the door.

MATERIALS LIST

Quantity	Size and Description	Purpose
1	¾" 4'x6' hardwood veneer plywood	basic cabinet unit
1	½" 28"x36" hardwood veneer plywood	door and drawers
1	¼" 24"x40" fir plywood	drawers
	¾" cove molding	

NOTE: Also need hardware, 4d finishing nails, brads, glue, wood finish and plywood trim.

This handsome piece of furniture occupies a minimum of floor area while providing maximum storage space. It's easy to build from plywood in just a few spare-time hours.

Build a Space-saving Wardrobe

The use of flexible veneer tape over raw plywood edges gives this relatively easy-to-build man's or woman's wardrobe a professionally finished look

THIS MULTIPLE-DRAWER wardrobe holds a man's shirts, socks, handkerchiefs, underwear and shoes, or the equivalent in woman's clothes. A slide-out rack keeps ties or belts neat and handy. You can build this wardrobe in just a few hours from plywood, and by using flexible wood tape to trim raw plywood edges, you will get professional results.

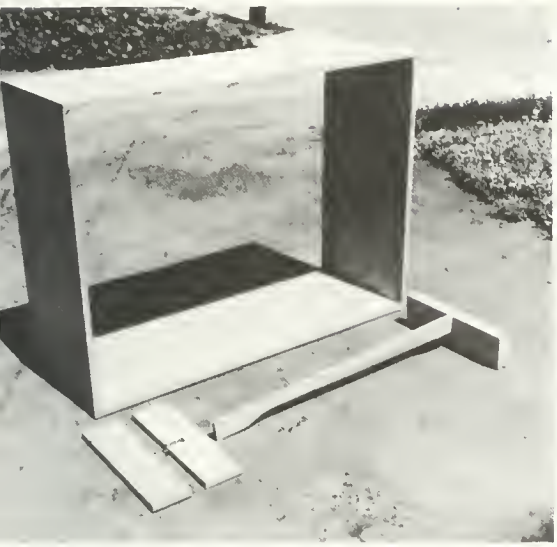
Start by making up full-size patterns from the dimensions shown on the plans. Transfer the lines to the appropriate plywood stock, and carefully cut out the pieces. It is best to cut the pieces just slightly oversize, and use sandpaper or production paper on a sanding block to trim each piece to exact size. It is important that all edges be square and true.

Assemble the top, sides, and bottom panels of ¾-inch plywood with glue and 6d finishing nails. Cover the exposed ends of the top and bottom panels before assembly. Set the nail heads below the surface of the wood, and cover them with Plastic Wood.

Make up the two base ends by gluing and screwing the inner, notched pieces to the outer pieces. Apply glue to mating surfaces, and insert the bottom brace in the notches. Fasten the base unit to the wardrobe frame with glue and #8 x 1½-inch flat head wood screws. Fasten the back panel in place with glue and brads; make sure it is ⅛-inch in from the frame edge along the top and sides.

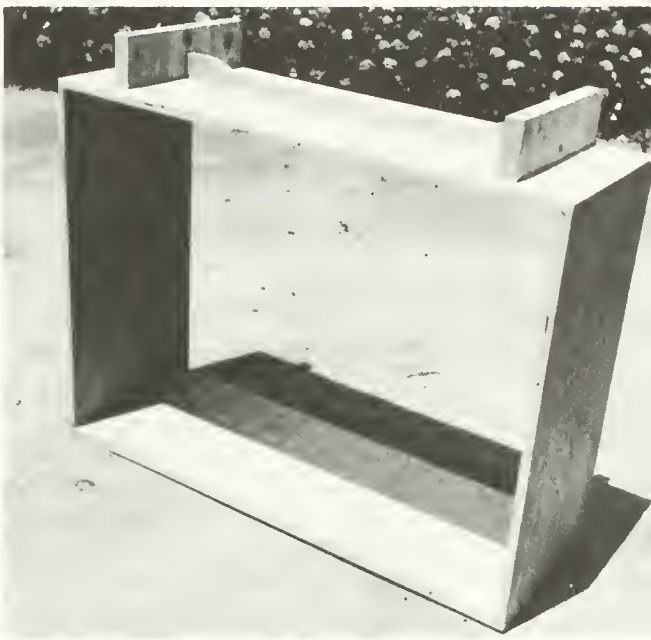
Use ½-inch square pine stock to make up drawer slides. Fasten them to the side panels, as shown on the plans, using glue and 5d finishing nails. Make up the two center divider panels, with their drawer guides, and install them with ½-inch square pine cleats at top and bottom, fastened with glue and 5d nails.

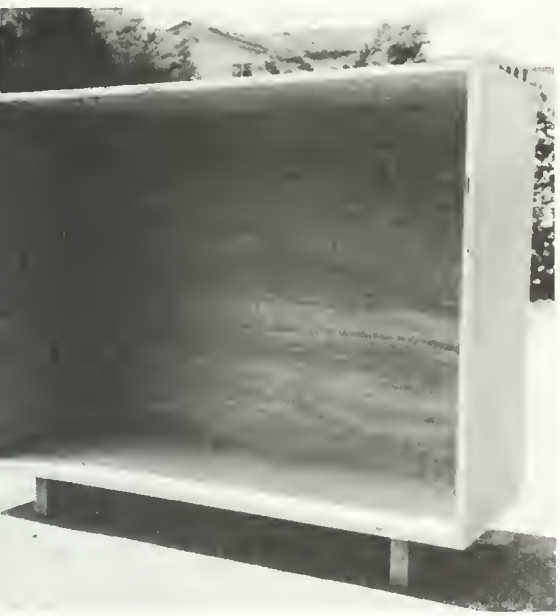
Next, assemble the framework for the



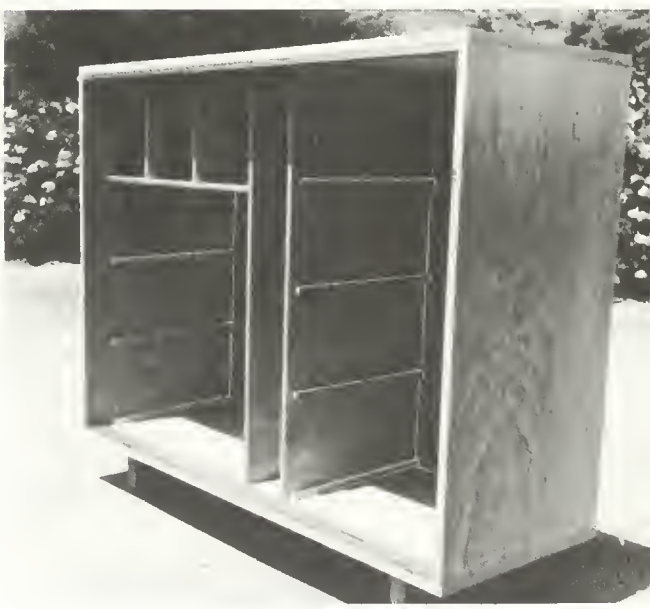
Assembled top, side and bottom form frame. Base ends are glued and screwed together. Notch in inside piece takes a brace.

Shown is frame upside down. The base is attached with glue and #8 x 1 1/2-inch flat head wood screws.





Back is attached with glue and brads, is 1/8-inch in from edge along the top and sides.



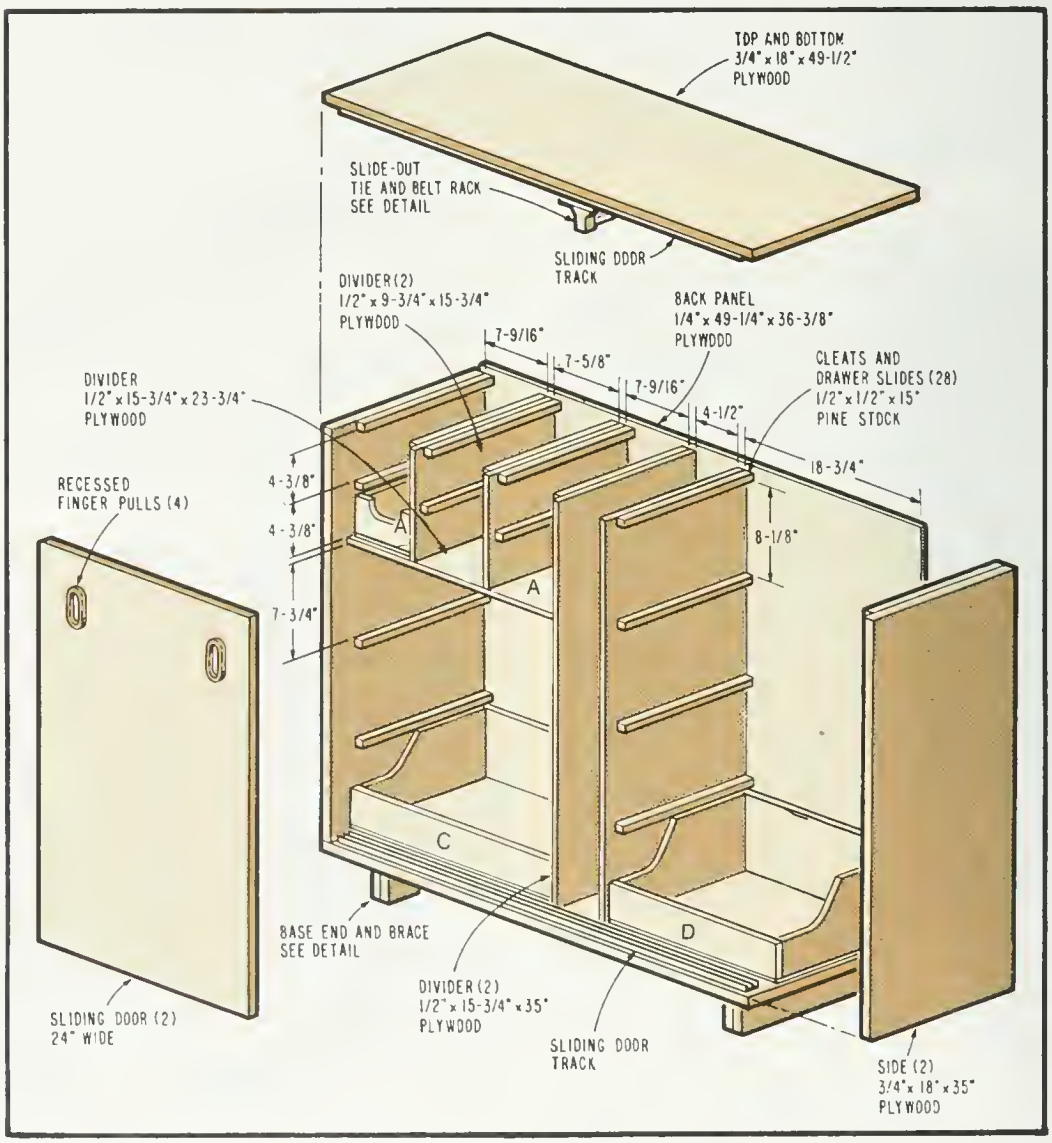
Installed sliding door track, dividers and drawer glides. Cover edges with wood trim.

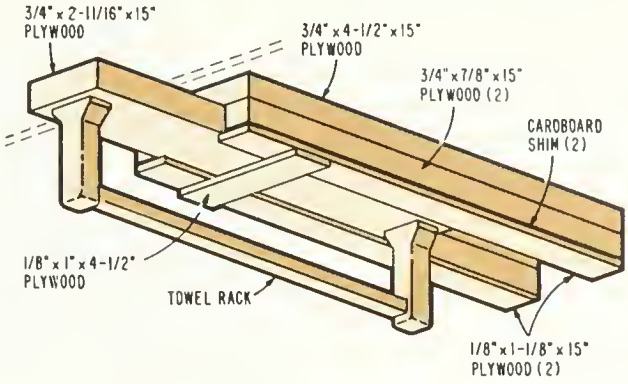
small drawers. Cut the base and two dividers from ½-inch plywood, install the drawer slides on the dividers and fasten the whole unit into the wardrobe frame with glue and 5d nails. Now cover all exposed plywood edges on the front of the wardrobe with flexible wood tape, and install the sliding door guides at top and bottom.

Two sizes of drawers are used, as shown on the plans. Construction is the same for all; just use glue on mating surfaces and fasten with 5d nails. Set the nail heads on the drawer fronts, and cover with Plastic Wood.

Now you can make up the sliding belt and tie rack, using a 15-inch towel rack. This is installed under the top, between the two center divider panels. Its construction

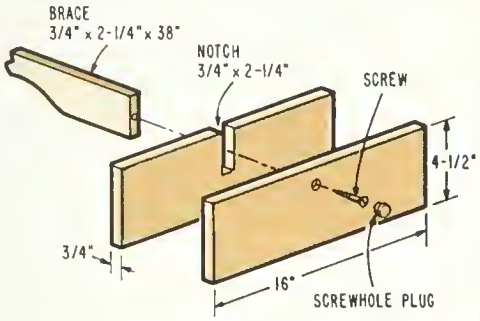
Exploded view showing position of various parts.



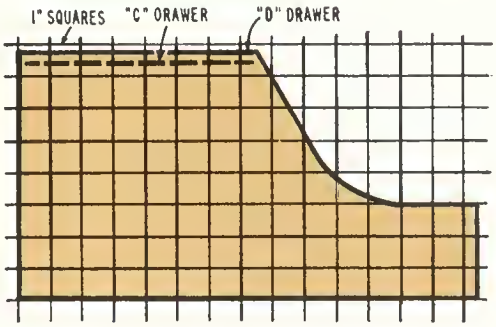

3/4" x 2-11/16" x 15" PLYWOOD
3/4" x 4-1/2" x 15" PLYWOOD
3/4" x 7/8" x 15" PLYWOOD (2)
CARDBOARD SHIM (2)
1/8" x 1" x 4-1/2" PLYWOOD
TOWEL RACK
1/8" x 1-1/8" x 15" PLYWOOD (2)

SLIDE-OUT TIE AND BELT RACK

Detailed view of sliding tie and belt rack. A 15-inch towel rack is used and installed under the top, between the two center dividers.



BASE END (4) AND BRACE



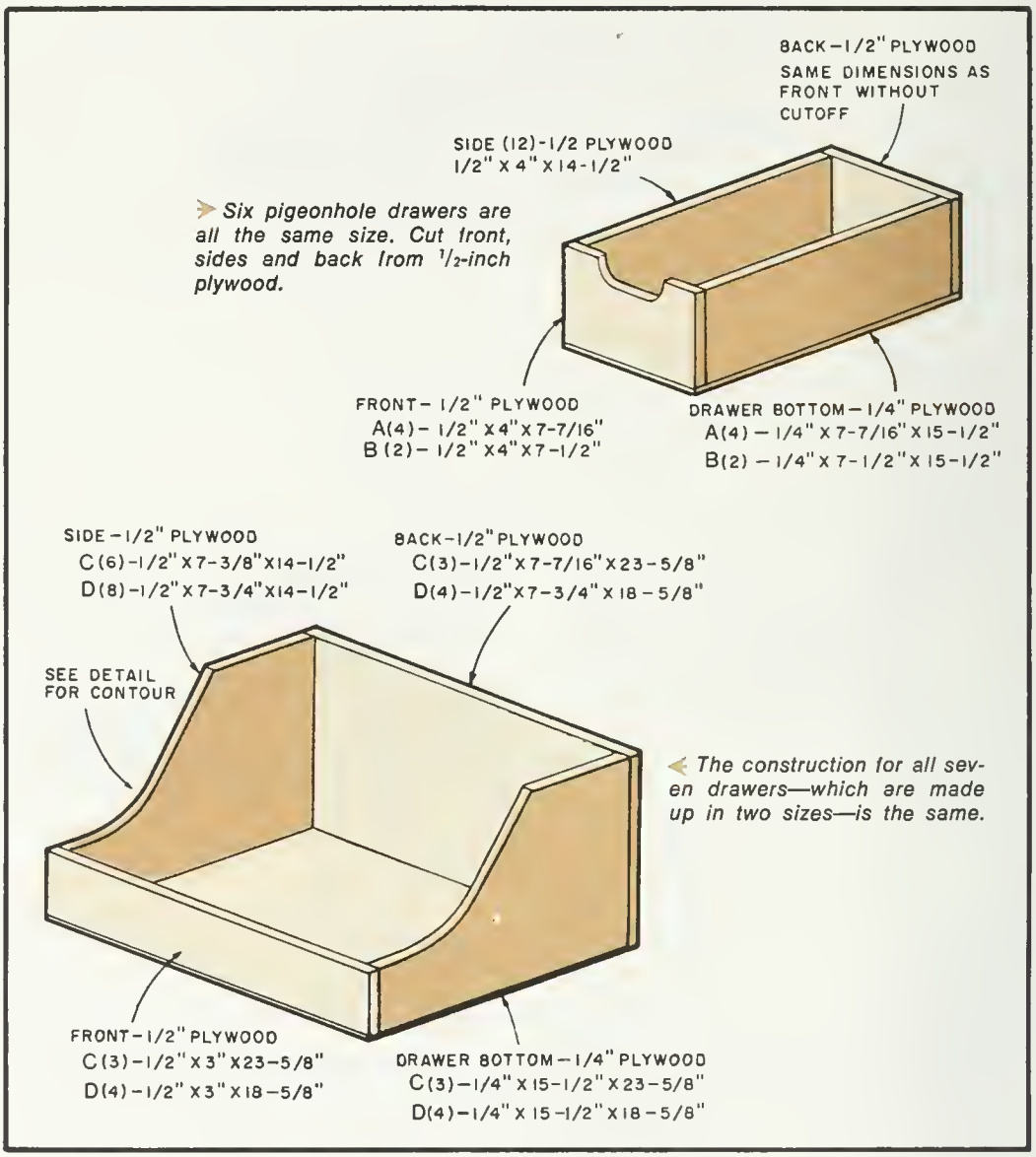
DRAWER SIDE

Inner, notched pieces of base ends are glued and screwed to outer pieces. Apply glue to mating surface, insert brace in notches.

MATERIALS LIST

Quantity	Size and Description	Purpose
1	3/4" 4'x8' plywood veneer	cabinet frame
1	3/4" 4'x8' plywood veneer	cabinet frame
1	1/2" 4'x8' plywood veneer	dividers and drawers
1	1/4" 4'x8' plywood	back panel
1	1/8" 37"x50" plywood or hardboard	drawer bottoms
1	15" towel rack	tie and belt rack
as needed	#8 1 1/2" flat head wood screws	
as needed	flexible wood trim to match plywood	

NOTE: Also need 5d and 6d finishing nails, contact cement, recessed finger pulls, sliding track, Plastic Wood and glue.


BACK—1/2" PLYWOOD
SAME DIMENSIONS AS FRONT WITHOUT CUTOFF
SIDE (12)-1/2 PLYWOOD
1/2" X 4" X 14-1/2"
Six pigeonhole drawers are all the same size. Cut front, sides and back from 1/2-inch plywood.
FRONT— 1/2" PLYWOOD
A(4)— 1/2" X4"X7-7/16"
B(2)— 1/2" X4"X7-1/2"
DRAWER BOTTOM—1/4" PLYWOOD
A(4) — 1/4" X 7-7/16" X 15-1/2"
B(2) — 1/4" X 7-1/2" X 15-1/2"
SIDE—1/2" PLYWOOD
C(6)-1/2" X 7-3/8" X14-1/2"
D(8)-1/2" X 7-3/4" X14-1/2"
BACK-1/2" PLYWOOD
C(3)-1/2" X 7-7/16" X 23-5/8"
D(4)-1/2" X 7-3/4" X 18-5/8"
SEE DETAIL FOR CONTOUR
The construction for all seven drawers—which are made up in two sizes—is the same.
FRONT-1/2" PLYWOOD
C(3)-1/2" X 3" X 23-5/8"
D(4)-1/2" X 3" X 18-5/8"
DRAWER BOTTOM—1/4" PLYWOOD
C(3)—1/4" X 15-1/2" X 23-5/8"
D(4)—1/4" X 15-1/2" X 18-5/8"

is shown in detail on the drawing. Note the use of cardboard shims to provide the clearance needed for the sliding action.

Each door panel is cut 24 inches wide; height will depend on the type sliding track used. Measure carefully, following the instructions of the track manufacturer. Cover the exposed vertical edges of each door with flexible wood tape, and install the recessed finger pulls.

Finally, give the wardrobe two coats of the desired finish, sanding lightly between coats. If you have chosen veneered plywood with good grain characteristics, a clear coating will bring out all the beauty of the grain.

When the finish is dry, the drawers can be inserted on their slides, and the front panels set into their tracks.

See also: CLOSETS; CABINETS; DRAWERS; WOODWORKING.

Build This Modern Desk

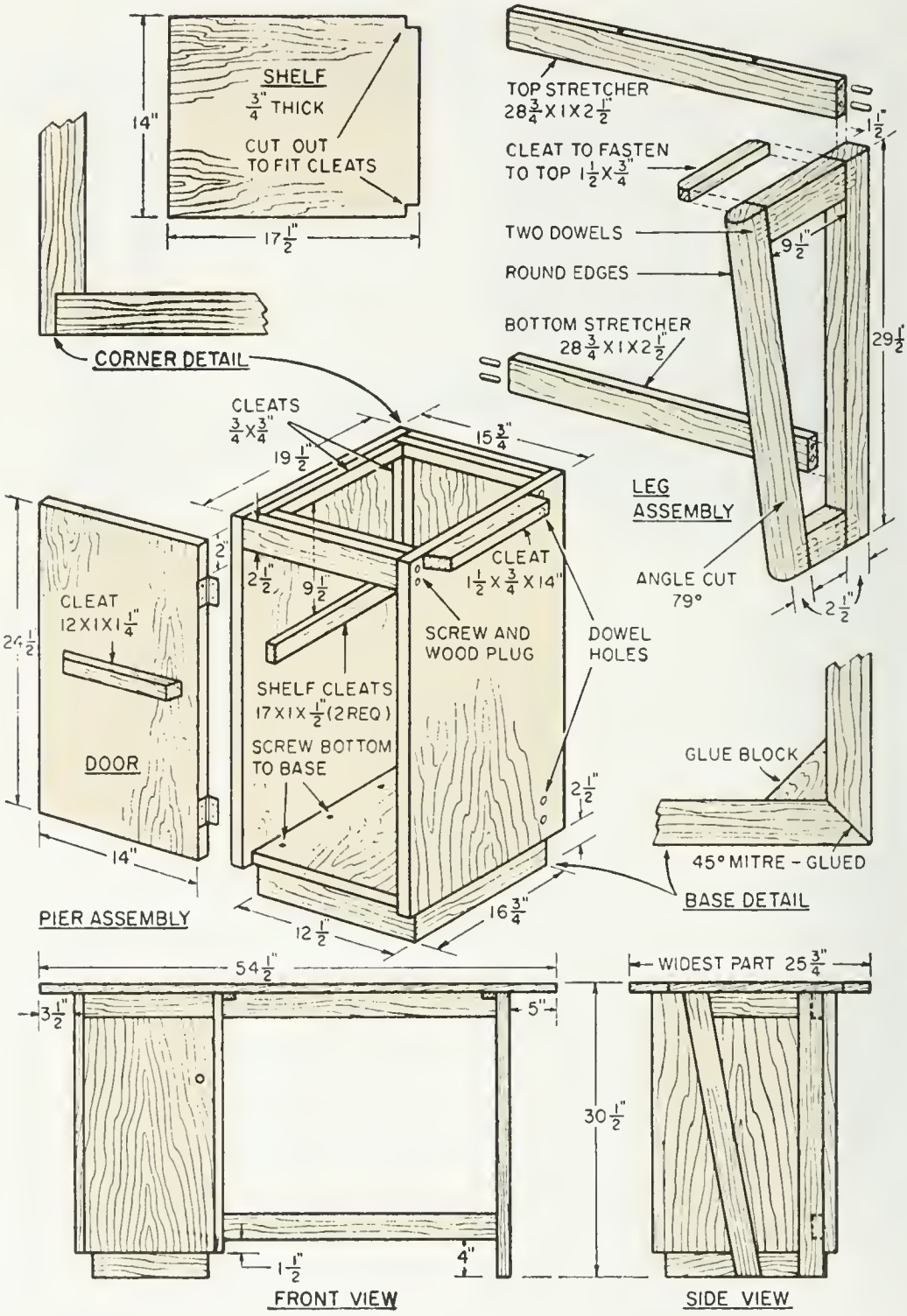
**Clean lines,
simple design make this piece
of furniture an easy
job for a home woodworker**

BUILDING THIS handsome desk is a project that any good woodcraftsman can undertake with confidence. The design could be modified, if so desired, by substituting drawers for a cabinet on the pier.

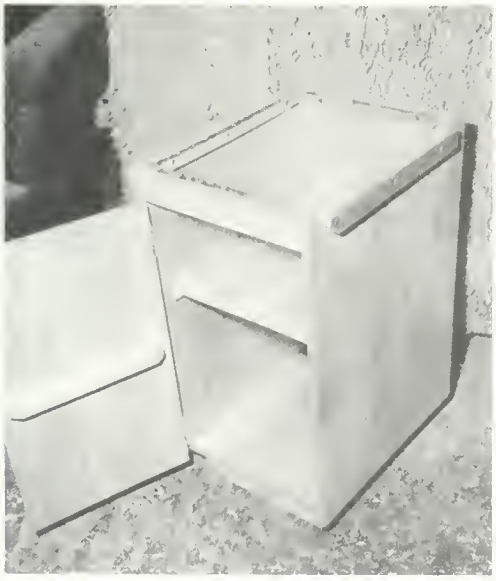
Start construction by edge-gluing one-inch stock birch from the top. Clamp and let dry, then plane all joints and sand to smooth finish. Cut shape of top with bandsaw or saber saw, then sand all edges smooth. Next glue up the stock for the pier section, and sand and plane it. Cut to size, then cut rabbet on bottom edge of sides and back and on back edges of sides. Cut a bottom piece to fit in the rabbet.

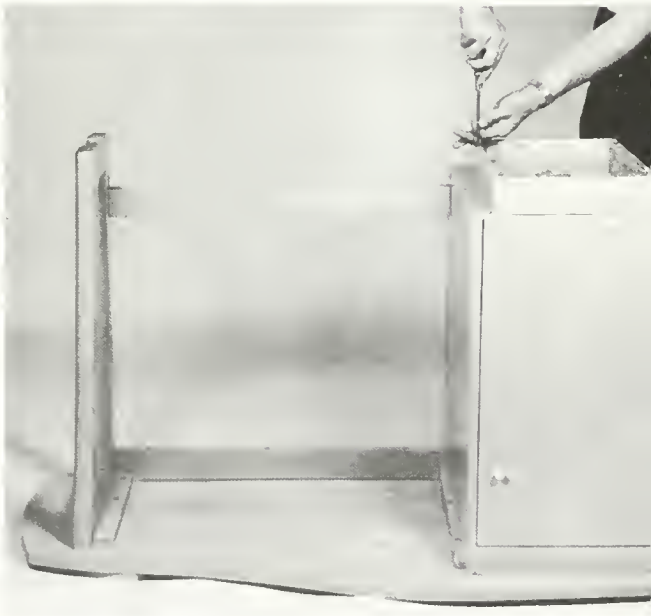
Bore upper cleats for #10 1½-inch flat head wood screws, then glue and screw cleats in place, setting them in $\frac{1}{16}$-inch from the edges so that when pieces are assembled they will draw up tight at the joints. Assemble the pier section with glue and screws, squaring the assembly and then fastening the bottom in place with screws.

Install a shelf in the pier section, and


SHELF
$\frac{3}{4}$" THICK
CUT OUT TO FIT CLEATS
14"
17$\frac{1}{2}$"
CORNER DETAIL
TOP STRETCHER 28$\frac{3}{4}$ X 1 X 2$\frac{1}{2}$"
CLEAT TO FASTEN TO TOP 1$\frac{1}{2}$ X $\frac{3}{4}$"
TWO DOWELS
ROUND EDGES
BOTTOM STRETCHER 28$\frac{3}{4}$ X 1 X 2$\frac{1}{2}$"
1$\frac{1}{2}$"
9$\frac{1}{2}$"
29$\frac{1}{2}$"
LEG ASSEMBLY
ANGLE CUT 79°
2$\frac{1}{2}$"
CLEATS $\frac{3}{4}$ X $\frac{3}{4}$"
19$\frac{1}{2}$"
15$\frac{3}{4}$"
CLEAT 1$\frac{1}{2}$ X $\frac{3}{4}$ X 14"
2$\frac{1}{2}$"
9$\frac{1}{2}$"
SCREW AND WOOD PLUG
DOWEL HOLES
CLEAT 12 X 1 X 1$\frac{1}{4}$"
24$\frac{1}{2}$"
DOOR
SHELF CLEATS 17 X 1 X $\frac{1}{2}$" (2 REQ)
SCREW BOTTOM TO BASE
14"
PIER ASSEMBLY
2$\frac{1}{2}$"
16$\frac{3}{4}$"
12$\frac{1}{2}$"
GLUE BLOCK
45° MITRE - GLUED
BASE DETAIL
54$\frac{1}{2}$"
3$\frac{1}{2}$"
5"
1$\frac{1}{2}$"
4"
FRONT VIEW
WIDEST PART 25$\frac{3}{4}$"
30$\frac{1}{2}$"
SIDE VIEW

▲ *Once the leg pieces have been assembled with glue and dowels, plane and sand the front edge round.*





◀ *At left the completed pier section, with shelf in place and door hung on butt hinges. Above, desk top is placed upside down and the pier-stretcher-leg assembly fastened to it. Here, final check is made for tightness.* ▲

hang the door on butt cabinet hinges, with a magnetic catch and brass knob. Cut the pier base pieces to size, mitering corner joints. Bore for #11 1½-inch flat head screws, apply glue, and assemble with corner blocks, making sure it is square. Now fasten base to pier.

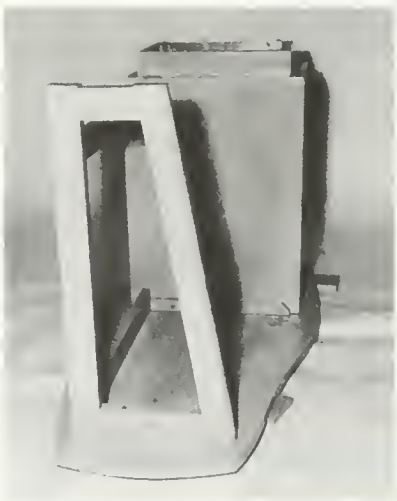
Cut the stock for the leg assembly and stretchers. Bore holes for $\frac{7}{16}$-inch dowels 2 inches long. Assemble with glue, clamping until glue has set. Remove clamps and plane and sand all joints flush, then round the front edge of the leg. Fasten a cleat to the top piece of the leg for fastening to the desk top.

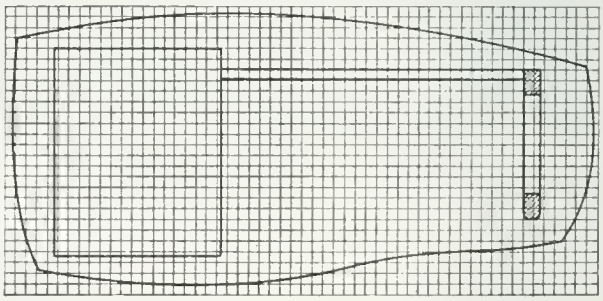
Bore two holes through the top stretcher for #10 2½-inch flat head screws. Plane and sand stretchers. Bore holes for $\frac{7}{16}$-inch dowels in stretchers, pier, and leg, place glue in holes and assemble pier, leg, and stretchers. Clamp square in all directions.

Place the top upside down, then place the leg and pier assembly on the top. Square and fasten all cleats and the upper stretcher to top, then sand again. Stain to the desired shade, apply a coat of sealer, sand lightly, and apply a finish coat of lacquer.

The trim, modern appearance of this desk will make it a welcome piece of furniture as well as a useful accessory in the living room, bedroom, or den. J.O.

See also: DESKS; DRAWERS; FINISHING, WOOD; STAINING; WOODWORKING.





View of the complete assembly showing how leg and top stretcher are fastened to desk top. Note that desk top is placed on scrap blocks to protect it. Above, desk top cutting diagram with 1-inch grid. Use bandsaw or saber saw to cut shape of top.

MATERIALS LIST

Quantity		Purpose
1	1″ 12″x12′ birch stock	top
1	¾″ 12″x10′ birch stock	pier and shelf
1	1″ 2½″x60″ birch	stretchers
1	1½″ 2½″x80″ birch	support
16	2″x7/16″ dowels	
as needed	#10x1¼″ flat head wood screws	
as needed	#11x1½″ flat head wood screws	
as needed	#10x2½″ flat head wood screws	

Build a Rocker for Your Patio

This indoor-outdoor design features one-piece sides with no joints to work loose

WHETHER IT'S FOR THERAPY or just for fun, you'll have a lot of satisfaction in building a rocking chair of your own. The one pictured here was designed for both indoor and outdoor use.

Each of the sides is cut from a single panel of sturdy ¾-inch exterior grade plywood, so there are no joints to become loose and creaky. The seat pad is a standard size, 22x44-inches, and easily purchased. Or you can make your own with waterproof covering material.

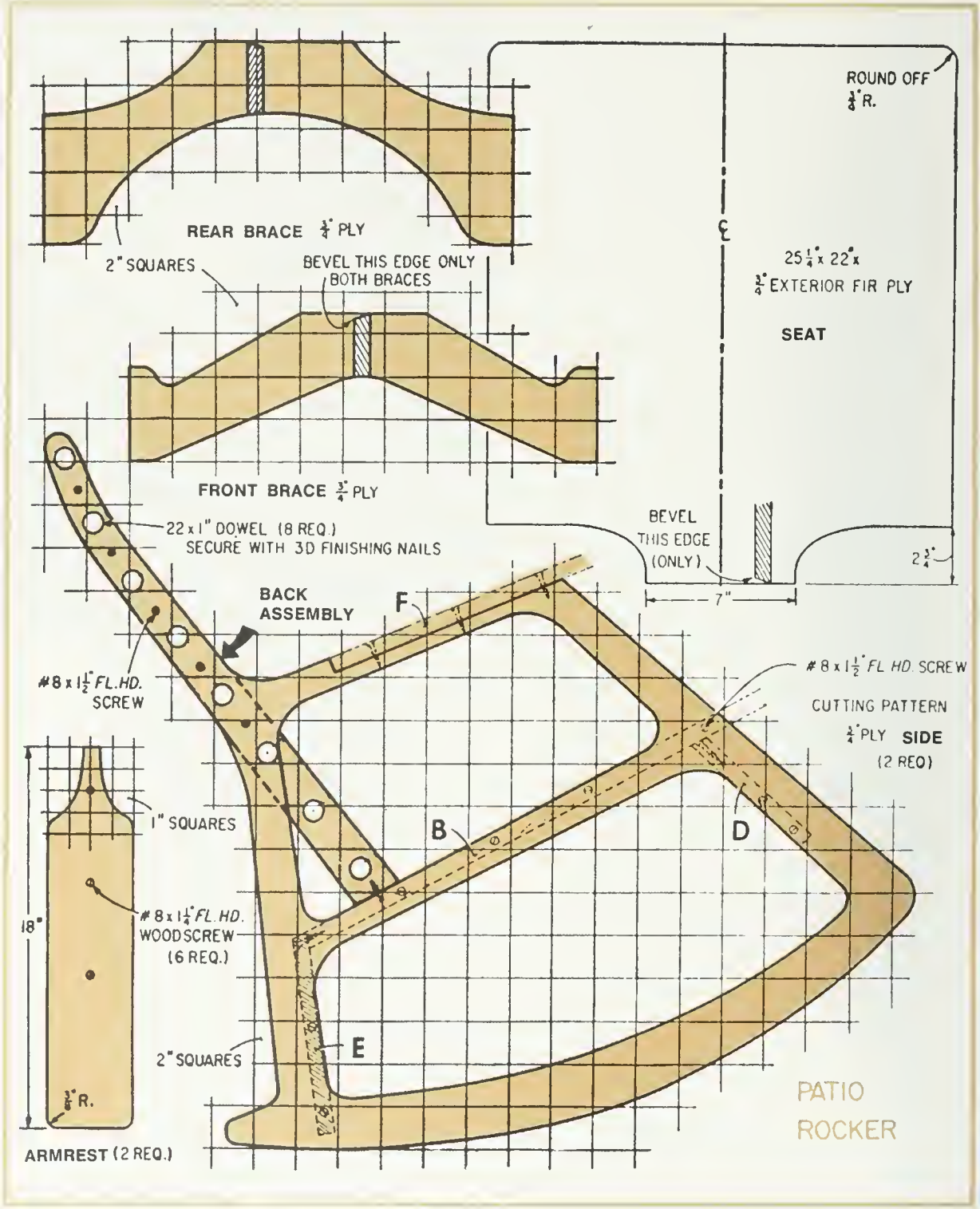
Start by cutting the two sides. Trace the pattern from the sketch on heavy kraft paper, on which 2-inch squares are drawn. The easiest way to draw the squares is to rip a strip of wood, about 20 inches long, to a 2-inch width. This automatically locates and guides each line for the squares. The paper must be at least 40x44 inches in size. When the squares are completed, outline the contours for parts A shown in the sketch to obtain a full-size pattern.

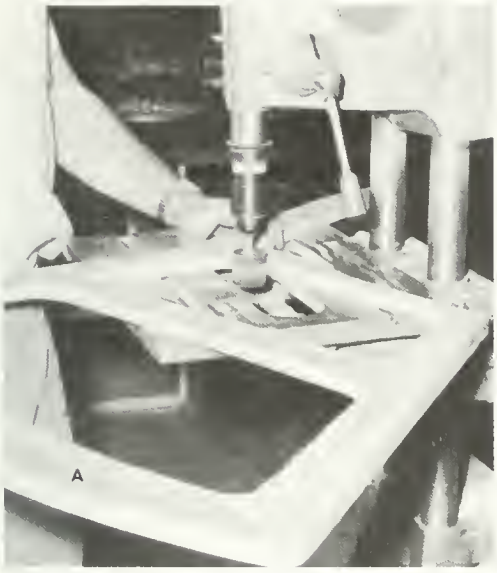
Cut out the paper pattern, place it on the plywood panel and trace the outline directly on the wood. Cut the plywood with a portable saber saw. When the first side is completed, use it to outline the second side, which is identical with the first. If you have a good quality saber saw, it will be possible to cut through both panels at once, so that the two sides can be made at the same time.

The inside curved edges should be smoothed and trimmed with a drum sander in a drill press, or with an attachment on an electric drill. A stationary disk sander is the easiest way to straighten and smooth off the outside edges of the sides.

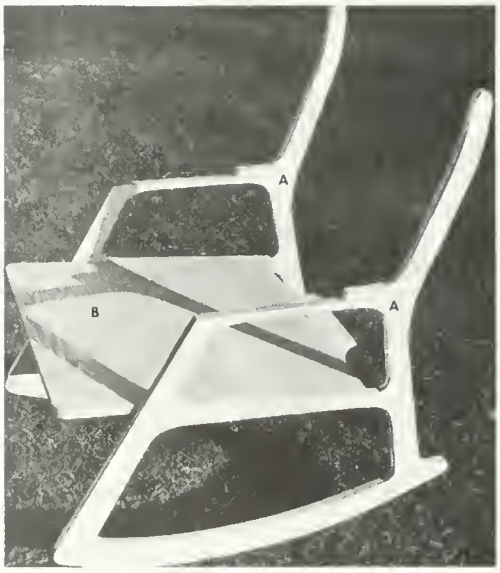
Cut the seat to its 22x25¼-inch size from the same plywood, rounding the front corners and shaping the back edge to leave a recess 2¾-inch deep at each side, as

furniture, unfinished: see unfinished furniture

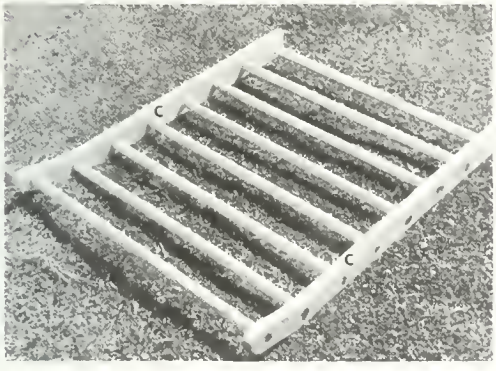

REAR BRACE ¾" PLY
2" SQUARES
BEVEL THIS EDGE ONLY BOTH BRACES
FRONT BRACE ¾" PLY
22 x 1" DOWEL (8 REQ.) SECURE WITH 3D FINISHING NAILS
ROUND OFF ¾" R.
25¼" x 22" x ¾" EXTERIOR FIR PLY
SEAT
BEVEL THIS EDGE (ONLY)
7"
2¾"
BACK ASSEMBLY
F
#8 x 1½" FL.HD. SCREW
#8 x 1½" FL HD. SCREW
CUTTING PATTERN
¾" PLY SIDE (2 REQ)
1" SQUARES
B
D
18"
#8 x 1¼" FL. HD. WOOD SCREW (6 REQ.)
2" SQUARES
E
¾" R.
ARMREST (2 REQ.)
PATIO ROCKER



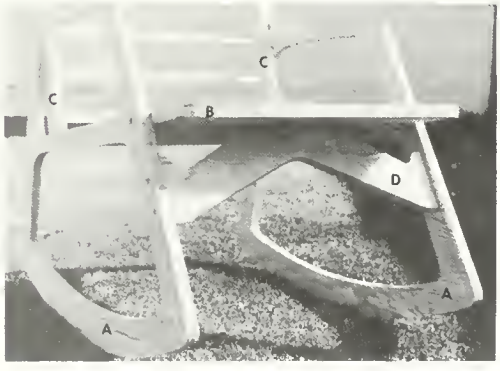
▲ *Each of the chair's sides is cut from a single piece of 3/4-inch exterior plywood, so there are no joints that might loosen.*



▲ *After rocker sides (A) have been cut to the plan size and shape, they are attached to part B (seat) with resin glue and screws.*



▲ *Back rest is constructed by gluing and nailing dowel rungs in holes drilled in the plywood side pieces (C). See plan details.*



▲ *The supporting brace (D) is attached to the side frames (A) and seat (B) with glue and screws. Take care to avoid splitting.*

MATERIALS LIST

Quantity	Size and Description	Purpose
1	3/4" 4'x8' exterior grade fir plywood	basic unit
8	1"x36" dowels	back rest
as needed	#8 1 1/4" flat head wood screws	
as needed	#8 1 1/2" flat head wood screws	

NOTE: Also need 3d finishing nails, plastic resin glue, wood dough, sandpaper, exterior paint and seat pad.

shown in the sketch. The 7-inch-wide projection at the back end of this seat is beveled. Attach the seat to the sides with 1½-inch screws and resin glue, in the position shown. Use four screws at each side.

Next make the back assembly, cutting the two vertical members from the plywood, each about 22 inches long, shaped as per plan. Drill eight 1-inch holes at uniform positions in both C strips, and assemble with the 1-inch dowels, cut to 22-inch length, for the ladder-back chair rungs. Use plastic glue and 3d finishing nails to lock the dowels in place. Install this back assembly with 1½-inch screws through the sides, reinforced with resin glue, and one screw through the bottom of the seat at each side.

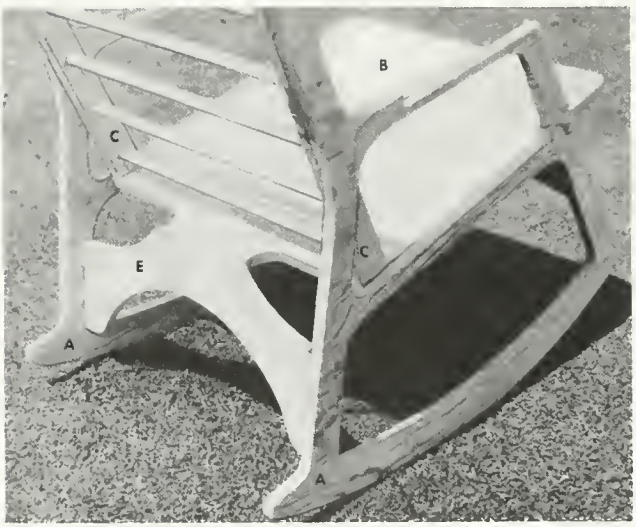
Cut and shape the part D front brace and attach under the seat with glue and 1½-inch screws through predrilled pilot holes. Clamp protective wood blocks over the plywood when driving the screws into the thin edges, to avoid splitting. The rear brace is also cut and attached under the seat in the same manner.

The final stage is to form the two arm rests, each 4x18 inches and shaped from a pattern drawn on 1-inch squares from the sketch. The front corners of the arm rests are smoothly rounded. The arm rests are attached with 1¼-inch screws, deeply countersunk, so that the heads can be covered smooth with wood dough.

After thorough sanding, give the rocker two coats of exterior enamel finish. The chaise padding will fit neatly and can be kept from slipping on the seat by tying a colorful plastic rope at the bottom of the back rest, the cord going through the openings in the sides at the rear of the back rest so it is anchored in place.

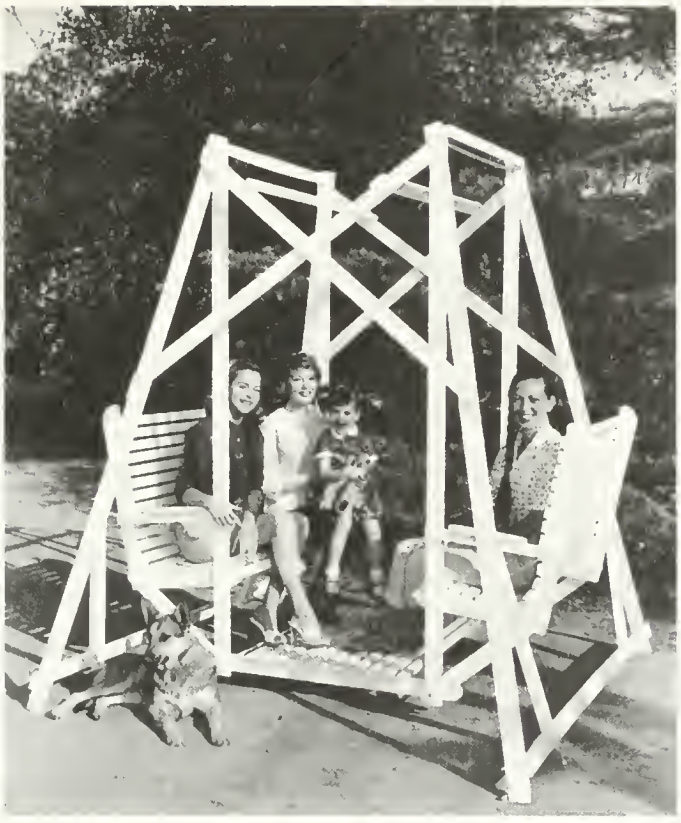
Original design by Steve Ellingson.

See also: CARTS; CHAISE; PAINTING; WOODWORKING.



Another support brace (E) is attached to back of side frames and seat in same manner used to attach brace (D) at the front end.

Arm rests (F) are shaped and smoothed to fit snugly in the notched side frames for attaching with deeply countersunk screws.



Put a Swing on Your Lawn

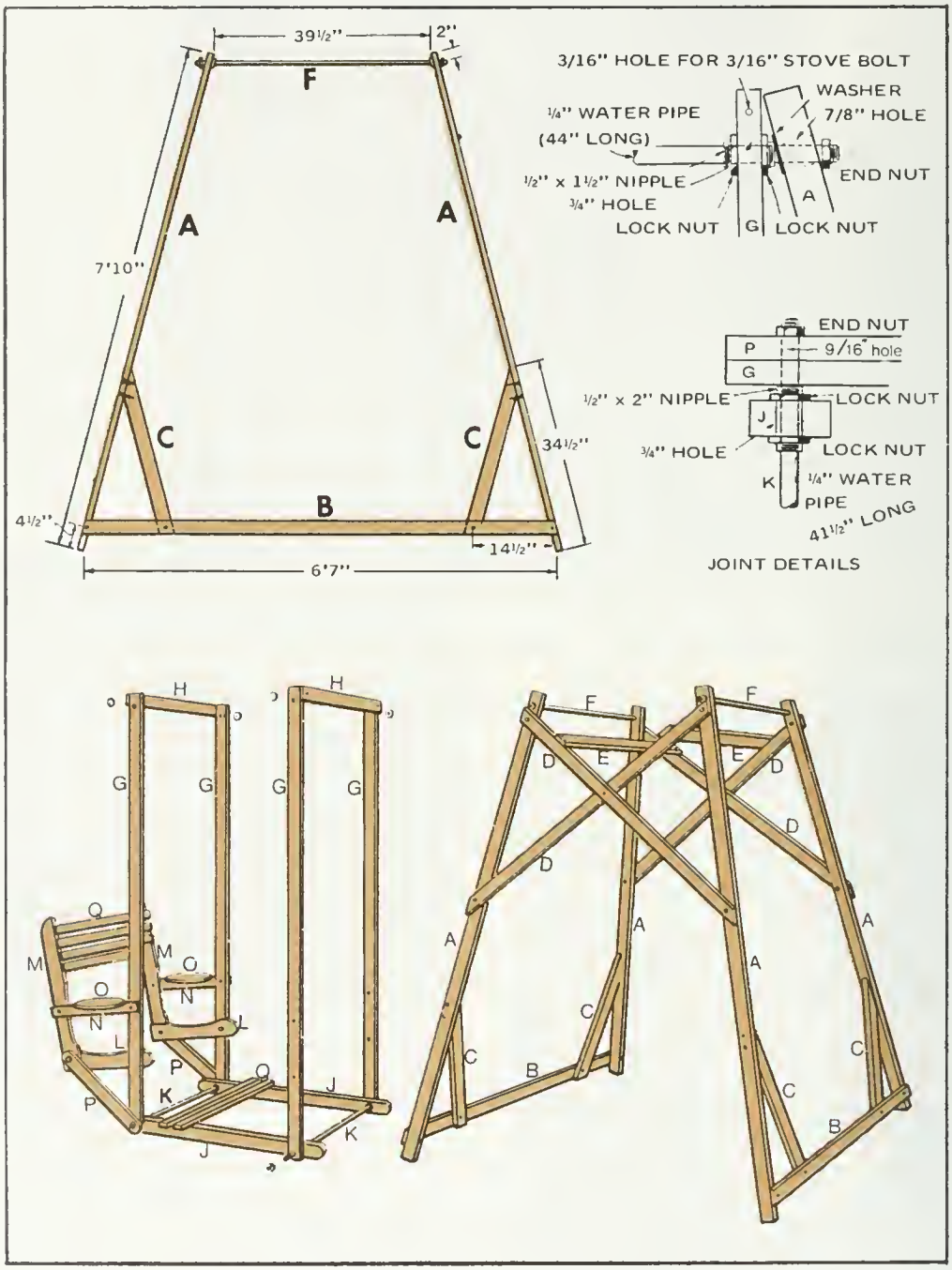
This easy-to-build family lawn swing will give you years of pleasure

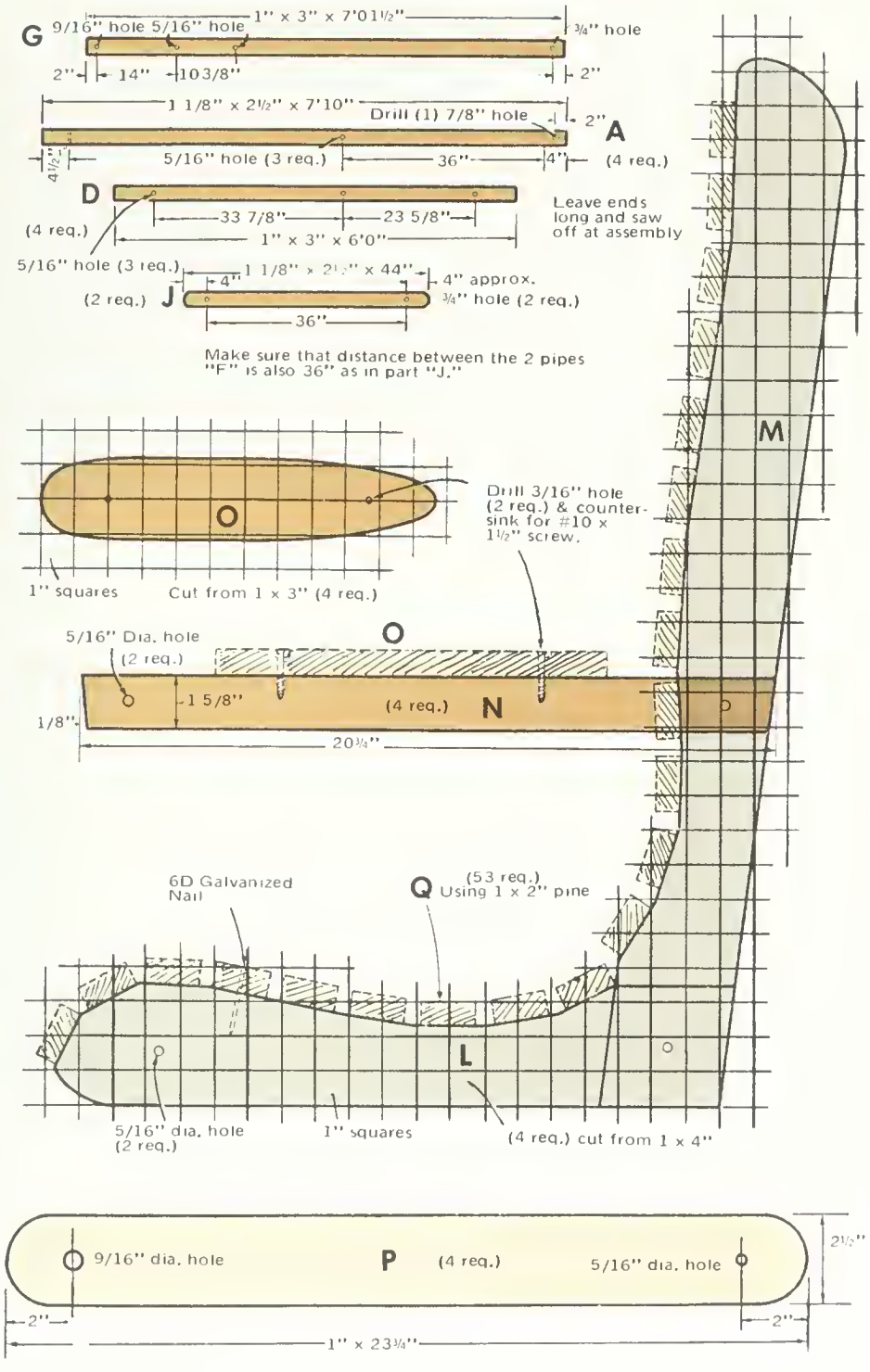
THE LAWN SWING is regaining its former popularity. This is a project that will prove completely engrossing to any handyman, and the result is a practical home accessory that can be used by the entire family for many years of pleasurable and satisfactory service.

Cut out all the four A parts, each 7 feet 10 inches long, from the 1⅛ x 2½-inch stock. These are the longest parts and form the basic yoke of the frame. Drill each of the parts for the three $\frac{5}{16}$-inch holes, and the one ⅞-inch hole, locating the holes at the points indicated in the drawing.

Arrange these parts on a flat surface in pairs. Take the measurements carefully and cut out the base and brace parts. Drill these parts and assemble to the frame with bolts and screws. Axle will help hold the parts together at the top. Next, cut the four side braces (D) and drill as indicated for three $\frac{5}{16}$-inch holes. These parts form the cross brace, which is bolted to the frame in the upright position.

Measure and saw the cross pieces (E) and fasten across the brace at the top with #10 x 1½-inch screws. These parts are located about 12 inches away from


39½"
2"
F
A
A
7'10"
C
C
34½"
B
4½"
14½"
6'7"
3/16" HOLE FOR 3/16" STOVE BOLT
WASHER
¼" WATER PIPE
7/8" HOLE
(44" LONG)
END NUT
½" x 1½" NIPPLE
¾" HOLE
A
LOCK NUT
G
LOCK NUT
END NUT
P
9/16" hole
G
½" x 2" NIPPLE
LOCK NUT
J
¾" HOLE
LOCK NUT
K
¼" WATER
PIPE
41½" LONG
JOINT DETAILS
H
G
Q
M
O
N
L
P
K
J
D
E
F
A
B
C


G
9/16" hole 5/16" hole
1" x 3" x 7'01½"
¾" hole
2"
14"
10 3/8"
2"
1 1/8" x 2½" x 7'10"
Drill (1) 7/8" hole
2"
A
(4 req.)
4½"
5/16" hole (3 req.)
36"
4"
D
(4 req.)
33 7/8"
23 5/8"
1" x 3" x 6'0"
Leave ends long and saw off at assembly
5/16" hole (3 req.)
1 1/8" x 2½" x 44"
4"
4" approx.
(2 req.) J
¾" hole (2 req.)
36"
Make sure that distance between the 2 pipes "F" is also 36" as in part "J."
M
O
Drill 3/16" hole (2 req.) & countersink for #10 x 1½" screw.
1" squares
Cut from 1 x 3" (4 req.)
5/16" Dia. hole (2 req.)
O
1 5/8"
(4 req.) N
1/8"
20¾"
6D Galvanized Nail
Q (53 req.) Using 1 x 2" pine
L
5/16" dia. hole (2 req.)
1" squares
(4 req.) cut from 1 x 4"
9/16" dia. hole
P
(4 req.)
5/16" dia. hole
2½"
2"
2"
1" x 23¾"

where the brace joins the yoke. Saw the four 7-foot 1½-inch G parts and drill a ¾-inch hole in one end for the ½ x 1½-inch pipe nipples. Press the nipples into the holes and lock in place with lock nuts. Hang one of the G parts in position by inserting axle into the nipple, checking the swinging arc to be sure that it clears the bottom brace.

Make two swing bottom (J) parts as shown, each with two ¾-inch holes, 36 inches apart. Put the ½ x 2-inch nipples through the holes and lock with nuts. The assembly of both the G and J parts is clearly shown in the sketch. The distance between the two F axles is 36 inches, the same as the distance between the ¾-inch holes in the swing bottom which means that the vertical G parts supporting the lower platform will be parallel.

Cut the swing cross pieces and assemble between the vertical G members over the axle F and complete the assembly of the platform by putting axle K through the nipples in parts G and J.

With the basic assembly completed, make the swing seats by following the outlines in the ruled squares. Drill holes as specified, and assemble as shown in the drawing.

Saw the required slats, and nail in place, spacing the slats uniformly at all times. You might use a narrow strip of wood, about ½-inch wide, as a spacer guide, placing this strip next to each slat before the next one is nailed on. Three different lengths are needed for these slats. They are for the seat, back, and platform.

Counterset all nailheads. Paint all parts carefully, partly disassembling any joint where necessary to reach the wood underneath, so that your swing is well protected against the weather.

Original design by Steve Ellingson.

See also: PAINTING; WOODWORKING.

MATERIALS LIST

Quantity	Size and Description	Purpose
5	1⅛″ 2½″x8′ lumber of your choice	part A and J
2	1⅛″ 2½″x6′ lumber of your choice	part C
9	1″ 3″x8′ lumber of your choice	part B, E, G, P, and H
5	1″ 3″x6′ lumber of your choice	part D and O
1	1″ 4″x8′ lumber of your choice	part L
2	1″ 4″x6′ lumber of your choice	part M
55	1″ 2″x8′ lumber of your choice	part N and Q
2	¼″x44″ water pipe	
2	¼″x41½″ water pipe	
as needed	½″x2″ nipples and locking nuts	
as needed	½″x1½ nipples and locking nuts	
as needed	5/16″x4″ carriage bolts with nuts and washers	
as needed	5/16″x2½″ carriage bolts with nuts and washers	
as needed	5/16″x2″ carriage bolts with nuts and washers	
as needed	¾6x3″ stove bolts with nuts and washers	
as needed	#10 1½″ flat head wood screws	
as needed	#12 2″ flat head wood screws	
as needed	6d galvanized nails.	

Patio Table

Picnic table and bench set for lawn or patio provides plenty of space for six or more adults

THE SECRET OF this table's strength is lap joints at the legs and table headers to provide extra bearing surface to take strain on the legs. If you work carefully and do a good job, the legs will never wobble.

Table top and benches are made up of standard six-foot lengths of 2 x 6-inch and 2 x 4-inch stock. The redwood and fir usually used for this type of table are fairly rough in texture as supplied by the lumber yard. If a perfect finish is desired, you can have the wood planed or sanded smooth by a local planing mill.

Start by making up full-size patterns for legs and headers. Mark the stock, and cut out the legs. These are shown with a taper, but they can be straight if you prefer.

Carefully mark the location for carriage bolt holes, and drill them. Cut the lap joint at the top of each leg; the bottom edge of the joint should parallel top of leg.

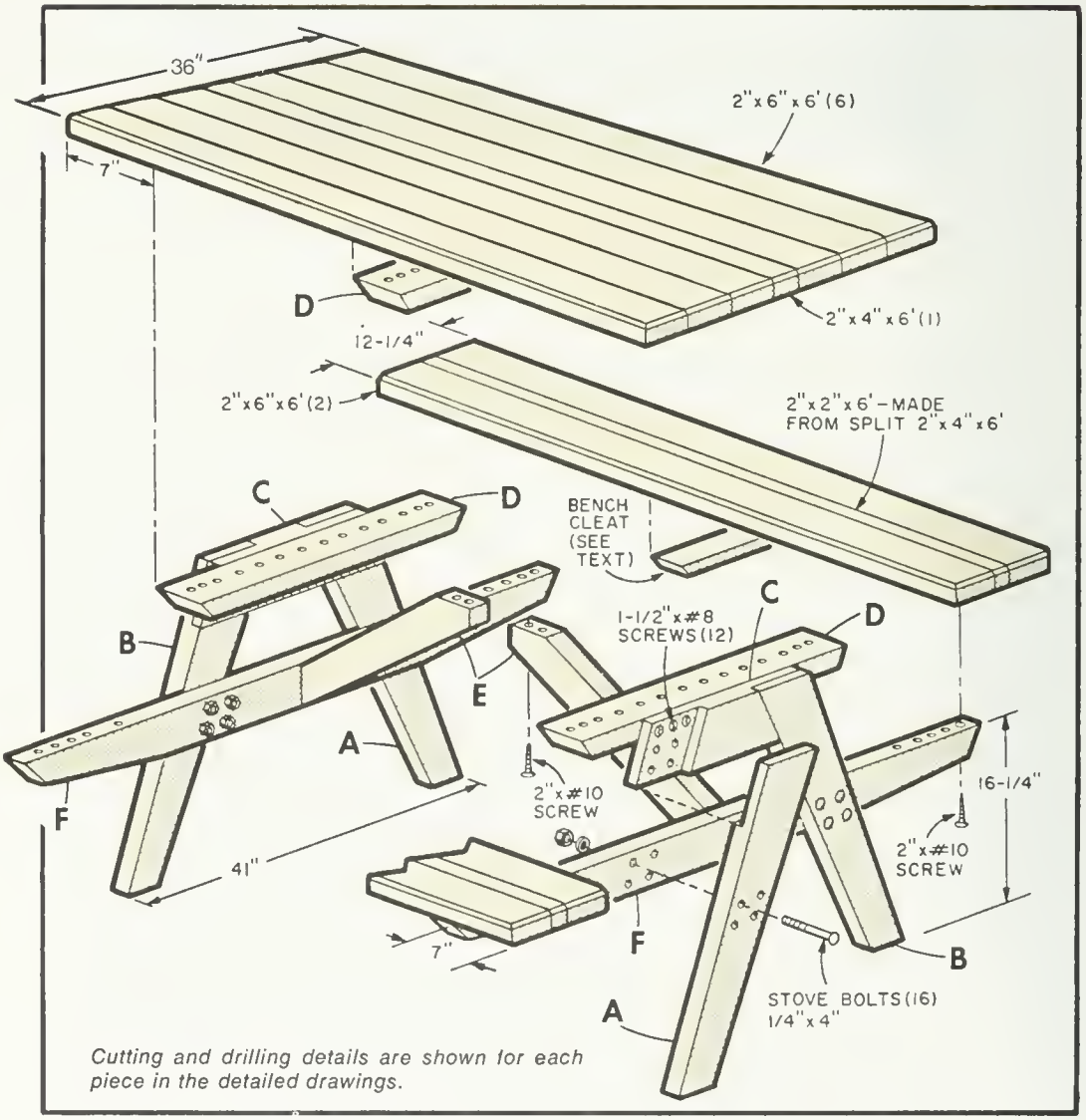
Leg top adds strength by replacing bearing surface to header lost by leg notch.

Cut out two headers. Mark and make the lap cuts as shown on the plans. Mark and drill $\frac{5}{32}$-inch holes at the seven points at each end of the headers. Three cleats are cut out next. Bevel the ends as indicated, and drill $\frac{5}{32}$-inch holes at the points shown. Countersink each to a depth of one inch. Screws through these holes will hold the top planks in place.

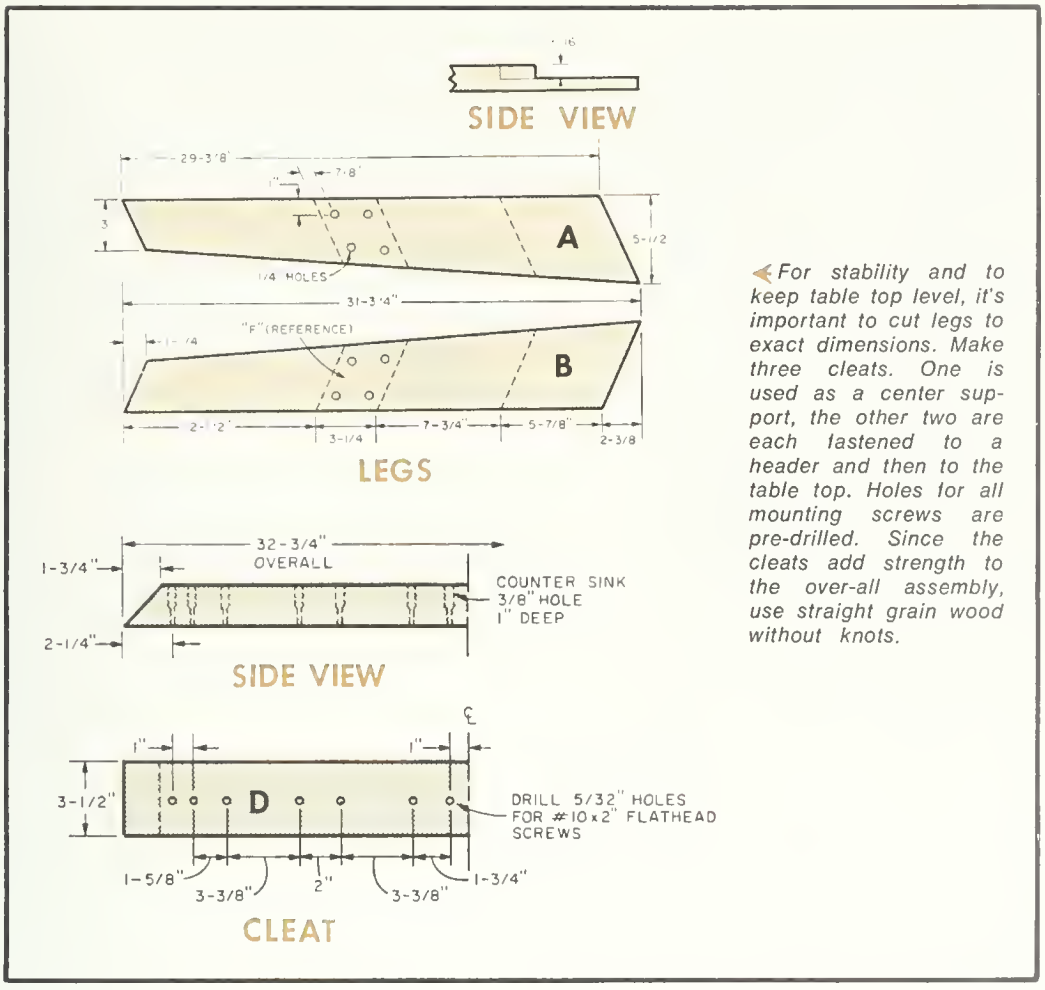
Attach each header to a cleat, using six #8 x 1½-inch flat head wood screws. Make certain each header is centered on its cleat, and using the pre-drilled holes as guides, mark for pilot holes in the cleats. Drill the pilot holes before installing the

MATERIALS LIST

Quantity	Size and Description	Purpose
12	2″ 6″x6′ fir or redwood	table top and benches
6	2″ 4″x6′ fir or redwood	table top, benches, cleats and legs
as needed	1/4″x4″ stove bolts and nuts	
as needed	1/4″ I.D. flat washers	
as needed	#8 1 1/2″ flat head wood screws	
as needed	#10 2″ flat head wood screws	



Cutting and drilling details are shown for each piece in the detailed drawings.



For stability and to keep table top level, it's important to cut legs to exact dimensions. Make three cleats. One is used as a center support, the other two are each fastened to a header and then to the table top. Holes for all mounting screws are pre-drilled. Since the cleats add strength to the over-all assembly, use straight grain wood without knots.

screws. Now fasten the legs to the headers, after marking for, and drilling, pilot holes. Use #8 x 1½-inch flat head wood screws through the four remaining holes at each end of each header. Check the spread of the legs, which should not exceed 41 inches.

Lay a bench support across each leg assembly. Use the pre-drilled holes in the legs as guides, and mark for ¼-inch holes in the support. Drill the holes, and attach the supports to the legs with ¼x4-inch carriage bolts.

The table top is made up of six 6-foot lengths of 2x6-inch fir or redwood, with a single 6-foot 2x4-inch plank in the center. Lay these out with the top side (if sanded or planed smooth) down on a blanket or newspaper spread on the floor to protect the surface. Attach each leg assembly with #10 x 2-inch flat head wood screws through the pre-drilled holes in the cleats. Mark and drill pilot holes first, after positioning the assemblies 7 inches from each end of the table. Center and attach the third cleat in the middle of the table.

Cut out the two braces and drill a $\frac{5}{32}$-inch hole as indicated, with a ⅜-inch diameter countersink, at the lower end of each brace, and two such holes at each upper end. Install the braces between the cen-

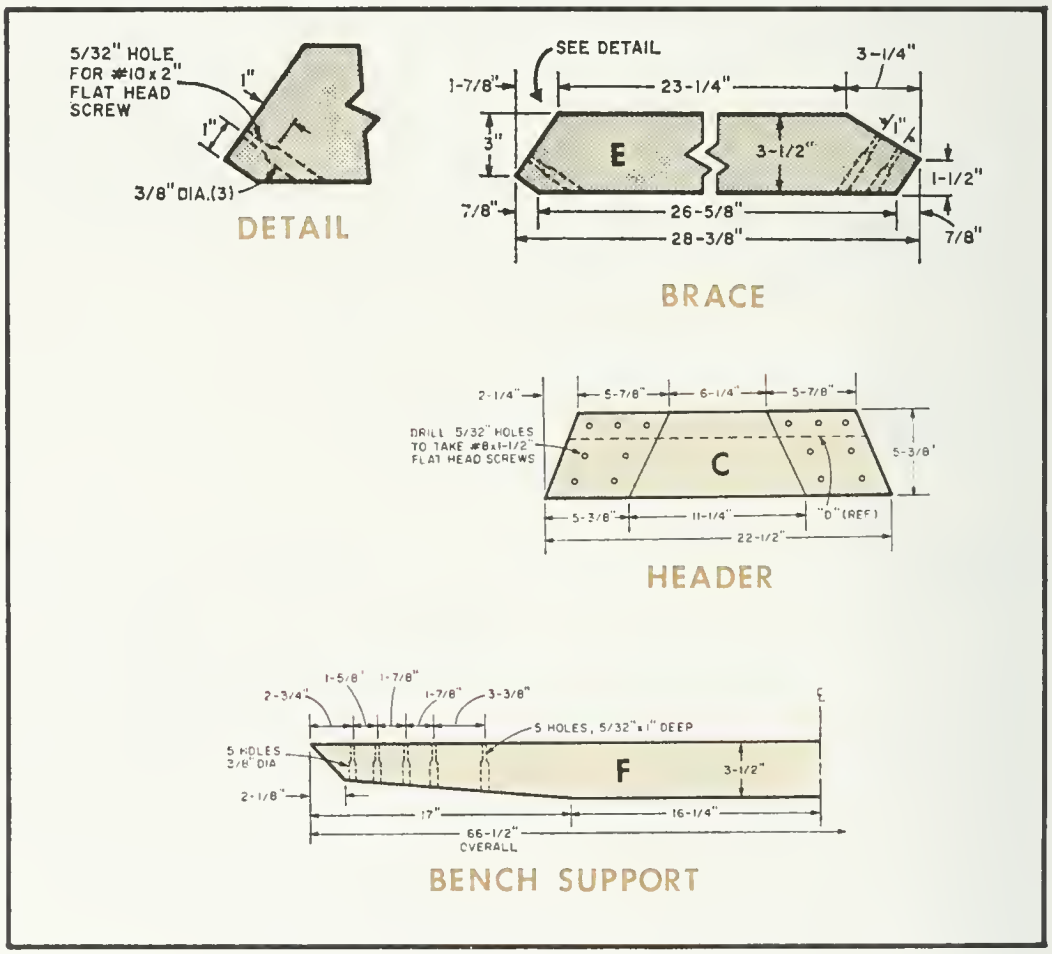
ter cleat and the bench supports, using #10 x 2-inch flat head wood screws.

Turn the table right side up and attach the bench tops. Each is made up of a single 2x6-inch x 6-foot board plank, split down the middle. Split a 2x4-inch x 6-foot board into two pieces, and use one in the center of each bench top. Fasten with #10 x 2-inch flat head wood screws, after drilling pilot holes and countersinking for screw heads.

You can make up additional cleats from scrap stock for use under the middle of each bench. This will prevent uneven sag—and possible pinching—when someone is seated on the bench. Also, it is a good idea to chamfer the top edges of the table and benches to eliminate sharp edges.

Finish by painting, staining, or varnishing as desired. If you plan to varnish, three coats of a good spar varnish are recommended.

See also: DECKS; PATIOS.



Header is a very important structural support. Not only does it align the legs, it is also fastened to the cleats that hold table top to entire assembly. Of equal importance are the bench supports. They must withstand weight of all seated on the bench. Brace strengthens legs and keeps them perpendicular to table top.

How to Buy and Restore Used Furniture

With an educated eye and a little effort, you can save hundreds of dollars by reconditioning furniture acquired at junk yards, second-hand stores or auctions

USED FURNITURE can be a boon or a bust. A few tips on what to look for can be of great help to the novice at this type of venture. What may appear to be a complete wreck at first glance may very well be a wise investment.

Take a night table. The drawer is completely disengaged from its guides, the shelf is unhitched, the back is loose. Sounds pretty miserable, doesn't it? But this very looseness—even the gluing blocks are askew—is a hidden benefit. Reassembling the little piece is a cinch, much like a kit! Regluing and refinishing are easy, as parts may be sanded, refinished, waxed (except where glue is to be used) without the bother of sanding in tight corners; the drawer can be cleaned, and a new pull added to blend the piece with other furnishings where it will be used.

After removal of old glue and refinishing of all parts, reglue the piece. Wipe off any squeeze-out as soon as possible, and your "kit" is ready to take its place as a night table, lamp stand or handy stand for a record-player. The stretcher-shelf is useful for stacking record albums or books. Cost? This one sold for a few dollars.

Metal furniture, if no parts have rusted badly or been distorted out of shape, is almost always a good buy. Look for baked-on enamel.

If cushion springs and padding are in good condition, use ready-made covers. Most sizes are available with zippers that allow easy removal when time comes to clean or replace them. One thing to look for when purchasing cushioned goods of any kind: the tag that states the object has been sterilized as required by law in most states. This assures you of a sanitary ready-to-use piece. If your state does not have such a requirement, exterminators and bedding manufacturers have facilities to take care of this at a minimal cost. It is good health insurance.

What to look for in metal furniture. Aside from the condition of the finish, a good quality note is the use of self-leveling glides on all legs. A little work with paint remover and a can of spray lacquer can restore the finish, but legs that cut into rugs and carpets and mar your wood or composition flooring may prove a costly item in the long run. Skip any furniture with loose rivets or cracked welds.

When parts are missing or broken. Many a time while exploring a second-hand furniture mart or a housewrecker's yard for a certain type of table or chair, you may find just what you had been searching for but, alas, a leg may be broken off right at the seat. Matching the leg would in most instances be impossible, but all is not lost. By the use of a glue such as resorcinol resin on dark wood, or epoxy on light wood, to join the wood parts of the leg, with a hardened spiral flooring nail driven into the mended

furring strips: see ceiling tile
fuses: see heating systems, home
fuses, auto: see electrical auto
fuses, home: see electricity
game birds: see hunting

▲ *Back strip loose, drawer falling out, stretcher askew—still a good buy.*

▲ *The loose gluing block makes it that much easier to reglue during restoration.*

▲ *Sturdy construction of this chair is obvious; cushions require a little work.*

▲ *Cushions are usually standard size, easy to re-cover or replace with zip-covers.*

leg from the top of the seat, the leg will support for years.

Many antiques are embellished with beautiful and elaborate carvings that add to the charm and grace of the piece, be it a table, chair, chest or headboard for a bed. If you are lucky enough to find such an antique, and discover that one or more parts of the carving are missing, look around you before you turn it down. Often you will discover a real mess that has been relegated to the back room for similar reasons, but has carvings or, say, period knobs suitable for the reclamation of your dream piece. It may be just a lone drawer with a pair of pulls to answer your purpose, and very cheap in the bargain. Another time it may be just an old-fashioned frame for a picture or mirror, but the molding may fit the style and period of your decor.

If a piece originally had two carved parts, and one has been lost over the years, search around for a discard (most second-hand places have such a section where real finds are to be had). You need not locate an exact match; perhaps a new pair of carvings will blend with the original work. Don't worry about removing the carvings. Leave the whole thing out in the weather, or soak it for a while in water, and the carved por-

Tag on used upholstered furniture insures that the piece has been sterilized.

Add top, you have a new table. Or legs alone may be used, as for lamp bases.

Cover is shot, but innards are sound. Good buy. New fabric will do wonders.

Don't be alarmed if the padding is popping; re-covering is a simple project.

"Rabbit ears" reveal age of this chair. Rush seat can be rewoven inexpensively.

The corner braces and firm gluing blocks on this chair indicate quality.

tion will slide right off, as most of this type of work was assembled with hide glue which is readily softened with water.

If you have no luck in this department, molded wood carvings in traditional designs are available from cabinetmaker's supply

USED FURNITURE TROUBLE SHOOTING CHECKLIST

Problem	Remedy
Chairs and Similar Pieces	
Missing piece of carving	Remove counterpart to balance appearance or replace with similar pair of carvings.
Upholstery, stuffing, springs	Remove completely, replace webbing and re-do with foam cushioning. Re-upholster.
Open dowel joint	Clean away loose glue, recoat with gap-filling glue and clamp joint until glue sets.
Cane seat broken	Replace with new caning sold in sheet form by cabinetmaker's supply houses. Or cover area with plywood, use foam cushion.
Short leg break near seat	Fit broken ends together carefully after coating both with gap-filling glue. Drive hardened spiral flooring nail down from top to reinforce.
Casters missing	Replace all or front or rear pair. If holes are undersized for new casters, re-drill.
Short break in mid leg	Drill broken ends about 3 inches to take 1/4- or 3/8-inch steel rod reinforcement before gluing ends as for short break above. Rod is available at large hardware stores. Do not use polyvinyl glue.
Long split in leg	Glue parts together with polyester, acrylic or resorcinol glue.
Wide split that will not close	Place cellulose tape firmly under split and over end to form dam. Then fill split with acrylic glue. When glue sets, remove tape.
Cabinets	
Local veneer "blisters"	If small, cover with layer of heavy paper, press down with hot electric iron. Slide block of wood on blister as iron slides off. Hold till cool. Heat softens hide glue, so blister is re-glued. On large areas, slit blister so it can be flattened, then repair as above.
Cracked marble top	Glue parts together with polyester glue made for purpose. If small pieces are missing or edges chipped, fill with the glue, matching marble color with mixed-in pigments.
Veneer edging separating	Iron back in place, as in blister treatment above. Or remove completely by wet rag soaking, and replace with new edging made for plywood. Buy it at lumberyards.
Missing period hardware	Try matching it at cabinetmaker's supply house. If it can't be matched, replace with nearest type.
Parts separating due to glue failure	Separate parts completely, clean away old lumpy glue from joints. Re-glue with white (polyvinyl) glue on non-load-bearing joints. Use casein, aliphatic resin or other non-creeping glue on bearing joints.
Rot in cabinet feet or base due to damp storage	Drill into rotted part, restore hardness to rotted wood by permeating with liquid resin which soaks into rotted areas, hardens, and makes wood stronger than new.
Plywood de-laminating	If only small area is involved run glue into inter-ply spaces, spread with spatula and clamp plies tightly to re-bond. If area is large, it's best to replace entire panel.

houses. When they are finished to match the wood in your purchase, or gilded for contrast, they can transform the lowliest piece into a replica of an authentic antique. Moldings are also made in a more modern style, if that is what is called for.

Upholstered furniture. Do not be alarmed when an upholstered sofa is popping at the seams. Many times the padding can be shoved back into its original position and the torn covering handsewn to hold it in place. Then a re-upholstery job can be done at home or, for a really excellent job, by a professional at far less than the cost of a new item.

Also, where the padding is visible, you can test its resiliency—and at the same time determine if it has been waterlogged or otherwise damaged before you buy. Now is the time to look for moth damage, and springs that may have to be replaced or retied. On sofas and easy chairs, damage may very well be confined to the cushions. In this case, replacement units of spring construction are sold by mail-order houses, which also stock foam units in rubber and polyurethane.

When there is an odd or off-beat seat shape, your local upholstery shop can follow almost any pattern. Simply cut out a template in cardboard, and it can be duplicated in foam of either type. Foam is also handy for giving resiliency and form to a flat seat. Simply place the foam, cut to shape, on the wooden seat and pull the fabric covering so that it gently rounds out the pad. Luxurious comfort and elegant appearance are your reward.

Trim of all sorts is another item to be had at a re-upholstery shop. This includes a wide assortment of fringes, welting, guimpe and upholstery nails. These, which are available in a variety of styles, can save the day when the re-doing of a chair seat by wrap-around method is not practical. Simply draw the fabric down to the base of the rim, fold under the loose edge of the fabric, anchor with a few staples (they won't show in the finished job) and make a neat and decorative border with the nails. The ornamental nailheads will conceal the staples.

Browse around. If this is your first venture into second-hand-land, look before you leap. It will pay to spend some spare time in as many shops as you can. Compare prices, try to spot the little deviations in style and design that mark a piece as valuable, such as the "rabbit-ears" on the back posts of the chair in the photograph. These are prized by many collectors, and make the difference between a real find and an ordinary "kitchen" chair. Sometimes a little effort to remove layers of old paint will reveal a lovely Early American piece.

Don't be afraid to turn things upside down! Corner braces and substantial gluing blocks are clues to quality construction and materials. G.D.

See also: ADHESIVES; ANTIQUING; CABINETS; FINISHING, WOOD.

GENERAL TIPS ON USED FURNITURE

Fastenings: Screws and dowels are more substantial than nails. Dovetail and "finger" joints are better than simple nail-and-glue types. Joints held by glue only, though separated by dampness in old pieces, may be made waterproof by re-gluing with modern resin glues like the acrylics, polyesters and resorcinols. Strength of joint will be greater than original.

Upholstery: Unless you are experienced at upholstering, leave tufted work to professionals. Smooth surfaced forms are within range of most do-it-yourselfers. Complex spring-and-padding systems are best replaced with foam cushioning. Many upholsterers will cut the foam to your pattern, if you buy it from them.

To buy or not to buy: If you can do the work required or have it done and still have a bargain, buy the piece you want. Used furniture savings often run to hundreds of dollars on a single piece.

This battered wreck was originally picked up for less than one dollar.

After rebuilding, you'd never know that this is the same rocking chair!

How to Rebuild an Old Rocker

Ingenuity and work can transform a battered rocking chair into a handsome, comfortable piece of furniture

A BATTERED WRECK of an old rocking chair was initially purchased from a housewrecker for less than one dollar in change. The original seat had been replaced by a home-made job of rope; slats were missing from the back; rungs and cross-members were loose, as were the rockers themselves. It hardly seemed like a bargain even at that price. However, a little work and ingenuity transformed it into a charming and serviceable piece that would do justice to the decor of any room.

The methods of restoring and reinforcing used on this chair would apply to any chair of similar structure, rocker or not, such as a dining chair or a ladder-back occasional.

Where to start. The first chore was cut-

ting away the old rope seat. In the course of this, it was discovered that the rope was about all that held the seat rails together, which made it a simple task to remove them for regluing. Next, the new seat rails were cut from dowels and dry fitted, and the crossmembers of the back were taken out, as well as the remaining slats, which served as patterns for new ones.

When replacing rungs, you can almost always find dowels to match. The slats in this particular chair were thin and delicate, thinner than stock lumber. If stock lumber is too heavy, trellis can be planed down to fit. However, in this case, wood from a fruit crate proved to be the exact thickness required, and with a little sanding, provided enough material to make the two missing members.

Before reassembly, old flaking paint was scraped off, then the whole thing was washed thoroughly with soap and water and allowed to air dry. Scrubbing down an old piece like this often reveals minute cracks in an apparently firm member, which if replaced at this time makes future repairs unnecessary.

Old glue was dug out of the sockets to prepare for new gluing. The glue chosen in this instance was a polyester resin type that is good in cases where fit is not too accurate, as it is not only a gap-filler, but actually hardens to a solid resin that will not powder out, and is completely waterproof. Available at boat supply stores, it can be pigmented to match wood tones if a natural finish is desired, or, as here, it may be painted.

If your chair does not require disassembly, but merely additional stiffening at joints, glue injector will save a heap of work. A $\frac{1}{16}$-inch hole can be bored right into the heart of the joint. Then the glue can be forced under pressure into the loose parts. Check with the manufacturer to be sure the glue you use is suitable for this type of application.

Regluing. First the sockets were coated with glue, then ends of rungs and slats. The rungs that form the side rails of the seat were set in place first. Then the slats were placed in the crosspieces of the back, and then came the tricky part. The back rungs, reglued, were very lightly put in place, leaving the long upright members free enough to allow the back to be inserted without popping out the rung. A little patient working of all the parts with a light touch, and the job was done. Since proper clamps were not at hand, the assembled work was tied with rope with cloth pads protecting the wood; the rope was twisted gradually to put the right pressure on the newly glued joints. Excess glue was removed quickly, as unsightly squeeze-out glue may be difficult to get rid of after it has set.

A new seat. Using a sheet of cardboard, a pattern was made by cutting and trimming for a snug fit, and traced on ½-inch plywood. Blocks fore and aft on the underside prevent the seat from slipping. As the seat fits between the front leg tops and the sides of the back, there was no problem here.

Cellulose fiber padding was placed on top, and a remnant of upholstery fabric—in this case a gold brocade—was pulled neatly around the wood, allowing the padding to roll slightly over the top edge for appearance, and to protect the fabric from undue wear. The material was fastened to the underside with a staple gun. For a professional touch, guimpe to match the brocade was applied around the edge of the seat with regular guimpe tacks.

Finishing. Since there was now a variety of woods—some old, some new, some from a crate—a natural finish was out of the question. To match the elegance of the new seat (which was made while waiting for the glue to harden), a black and gold scheme was used. First, a coat of flat black enamel was applied and allowed to dry thoroughly. Then a small can of gold leaf enamel and a small artist's brush were used to paint a

design of flowers and fruit across the top of the back and on the outside of the rockers. Tiny, even, curved strokes produced a dainty effect on the slats and lower crosspiece. Slight brushing of gold was used on the rims of the finials on the back uprights.

To keep the design from being smeared, as the flat black does have a slight tendency in that direction, a coat of clear shellac was used for a final finish. This also gave a soft satiny luster which is most attractive.

When all was dry, the new seat was popped into place, and the old wreck was restored to its original use, a comfortable rocker.

For a natural finish throughout. When parts do not have to be replaced but simply reglued and reinforced, a natural wood finish can recapture the style of the original period. Most old pieces were finished with shellac, an easy-to-use quick-drying product which does not pick up dust before setting.

If there are old layers of shellac on the work which have darkened over the years, an alcohol wash-down may be all that is needed to prepare for a new finish. If possible, do the job outdoors, and wear rubber gloves, as denatured alcohol is hard on the hands. Avoid breathing in the fumes as much as possible. The first wash may seem disappointing, as it merely softens the old shellac, but successive washes will gradually reveal the original tone of the wood. Use lint-free pads so that you work to a smooth surface.

When the old finish is removed to the point where you want to restore luster, thin, even coats of clear shellac will bring back the brilliance without darkening the tone. Sand with fine cabinet paper between coats to achieve a professional, "silky" finish. Buffing with paste wax can be used as a final touch, but in most cases is not needed.

Natural finishing for painted chairs. If your chair has been painted by previous owners who desired it to fit a definite color scheme, but you would prefer the natural wood, paint remover is the answer. Some are volatile, and should be used outdoors, as a safety measure. The volatile types usually call for a washdown with benzine or equally flammable rinses. If you do not have facilities for working outdoors, shop for a remover than can be rinsed off with water. In any event, wear glasses to protect your eyes from spatter, and rubber gloves to protect your hands from long exposure to the solution.

Modern paint removers work fast; when the surface is wrinkled and blistered, wipe off and rinse, or rinse only, according to instructions on the label. When old paint is imbedded in grooves or carving, use an old toothbrush or steel wool. Here is where glasses are a must, as the spatter really flies!

Allow ample time for the piece to dry before applying the new finish. On very old work, it may take several applications of remover before the piece is really clean. Old-fashioned buttermilk paint, a precursor of our new casein materials, is notoriously stubborn, but patience will win, and the end result be most rewarding.

Cane-webbing seats. Machine-woven cane webbing makes it easy for the amateur to do a good job. If there is a reed spline driven into a groove around the perimeter of the seat, remove it as carefully as possible, to serve as a pattern for the new one. Try not to widen the groove as you work, even if this means taking out the old spline in pieces. Save the pieces to send with your order for a perfect match. Next, clean out any old glue that may be in the groove.

Before attempting to apply the webbing, try the new spline, or check the old one, for fit, and cut the webbing so that it extends ¼-inch beyond the groove all around. Ordinary shears will suffice for this. Then thoroughly soak the cane webbing. This makes the webbing easier to work, and allows it to shrink to a taut fit when dry.

Lay the webbing on the seat so that it is centered with an even ¼-inch overlap as

mentioned above. When sure of your fit, use glue in the groove, making sure that the adhesive has coated sides and floor of the groove. Then, with a wedge-shaped piece of wood, work the wet webbing down into the groove. Next, using a small wooden block and a hammer, tap the spline into place. On square seats, the spline should be notched at the corners. Remove any glue run-over as quickly as possible. After the glue has set and the cane is dry, trim any edges of the cane that may show as fray beyond the spline.

Cane seats without splines. Where a cane seat is desired, but there are no splines in the original, all is not lost. Soak the cane as mentioned above, and staple or tack it to the rim of the seat. Then use thin strips of wood to match or contrast to the wood in the chair, as your fancy dictates, and glue the strips over the tacks or staples. Finish the strips.

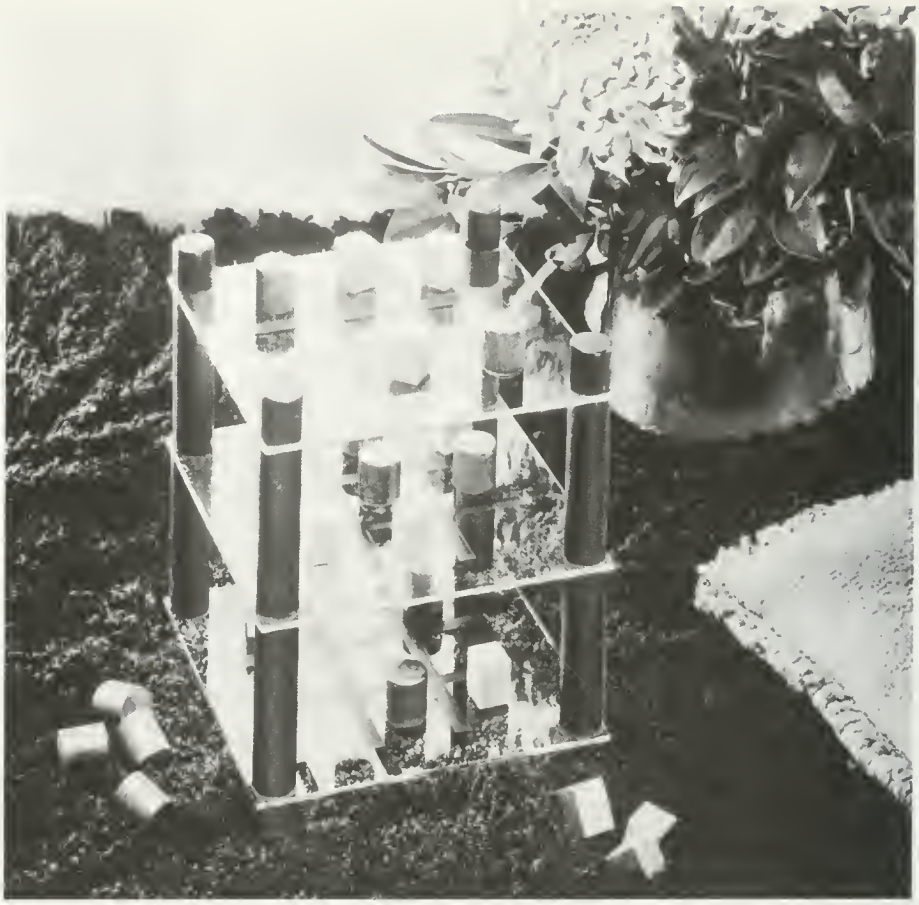
Your battered old rocker will be unrecognizable after you have finished the restoration process, and will look like a brand-new piece of furniture.

See also: ADHESIVES; ANTIQUING; DECORATIONS; FINISHING, WOOD; PAINTING.

A sharp utility knife made short work of removing the old home-made rope seat.

Thorough washing with soap and water removes last of old paint and dirt.

Fabric is stapled down, anchoring the padding, then guimpe is tacked in place.



Make This Plastic Game Board

You can play three-dimensional tic-tac-toe on this board, or merely use it as a handsome decorative object

A SIMPLE PROJECT like this three-dimensional tic-tac-toe board is a good way to get started making things of acrylic sheet. The board can serve as a decorative piece or as a diverting game—three-dimensional tic-tac-toe is a lot more complicated than the old fashioned one-dimensional kind.

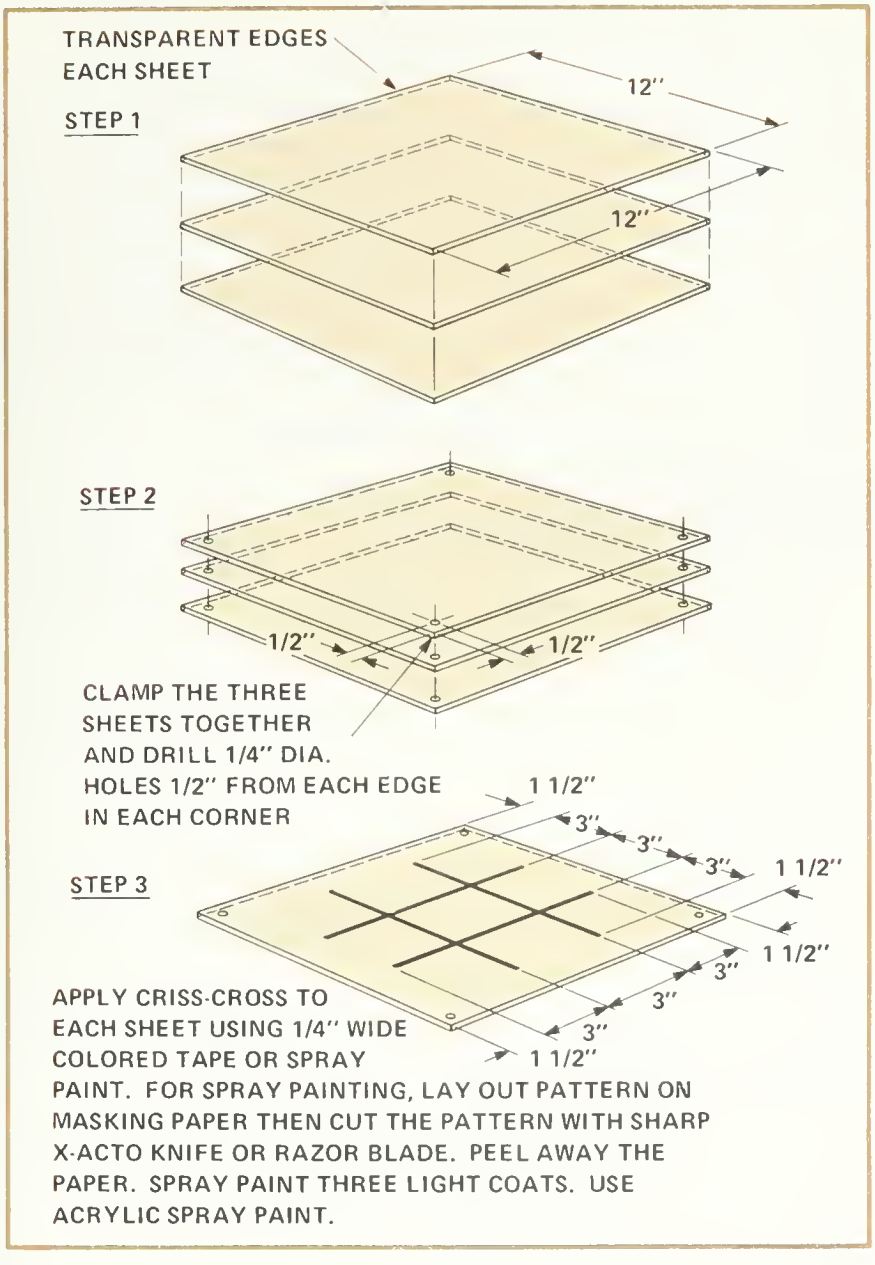
Acrylic sheet is available at many hardware stores and lumber dealers, as are any special tools. Few tools are required and they are inexpensive.

To make the tic-tac-toe board, start with three 12 x 12-inch sheets of ⅛-inch acrylic. Some dealers will cut acrylic to size, but you can do it yourself easily.

Acrylic sheet up to ¼-inch thick can be scored with a special tool, then broken apart over a ¾-inch wood dowel. Or, it can be cut with power tools. If you use a band saw or a reciprocating jig saw, choose a blade with at least 14 teeth per inch. If you use a circular saw, use a steel crosscut blade of the same type recommended for finish cuts in plywoods and veneers.

Two cutting tips: do not force the tool through the work—easy does it—and leave the masking paper on while you cut. This protective paper covers both sides of each sheet of acrylic that leaves the factory. If

garage conversion: see garage remodeling



you have a sheet that has no masking paper, cover the area of the cut with ordinary masking tape on both sides. Saw through the tape.

The same cutting tips apply to drilling the ¼-inch holes in the four corners of each layer of the tic-tac-toe board. You can use an ordinary twist bit in a hand drill or you can use a high-speed bit in a power drill, but remember, don't force the drill into the work and leave the masking paper on when you cut. If you are using a hand drill and a twist bit, turn it slowly.

With the masking paper still on, polish

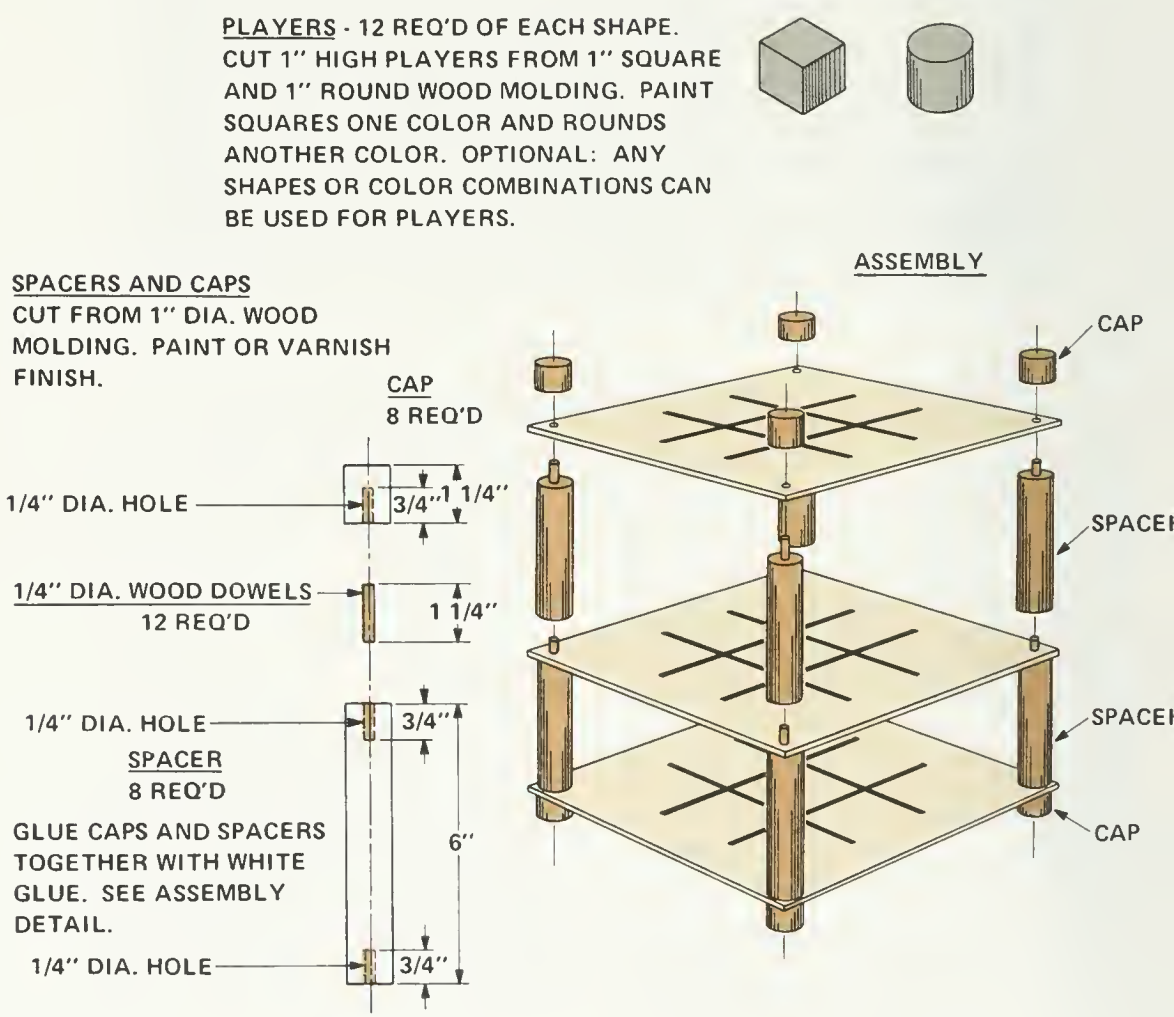
the edges to transparency. This is done by starting with 60-80 grit paper, then going to 150-220 grit wet-or-dry paper, and finally to 400 grit. Then buff with a muslin wheel dressed with fine-grit buffing compound and finish off with a clean flannel wheel.

Now, you can peel off the masking paper and apply colored plastic tape (available in art supply stores) to make the playing squares. Or, you can leave the masking paper on, lay out the lines on the paper, cut them out with a razor blade and spray the exposed surface with acrylic spray paint. Use three coats. When the final coat is dry remove the balance of the masking paper.

The spacers are cut from one inch round molding and drilled to receive ¼-inch dowels as fasteners. Sand them and varnish or paint them. The counters are made in the same way—12 from one inch round and 12 from one inch square wood molding. Or, plastic rods are available in a variety of colors and shapes.

When you assemble the board, use white glue to fasten the dowels and spacers together. F.C.

See also: PLASTICS, FABRICATING.


PLAYERS - 12 REQ'D OF EACH SHAPE. CUT 1" HIGH PLAYERS FROM 1" SQUARE AND 1" ROUND WOOD MOLDING. PAINT SQUARES ONE COLOR AND ROUNDS ANOTHER COLOR. OPTIONAL: ANY SHAPES OR COLOR COMBINATIONS CAN BE USED FOR PLAYERS.
SPACERS AND CAPS
CUT FROM 1" DIA. WOOD MOLDING. PAINT OR VARNISH FINISH.
CAP
8 REQ'D
1/4" DIA. HOLE
3/4"
1 1/4"
1/4" DIA. WOOD DOWELS
12 REQ'D
1 1/4"
1/4" DIA. HOLE
3/4"
SPACER
8 REQ'D
GLUE CAPS AND SPACERS TOGETHER WITH WHITE GLUE. SEE ASSEMBLY DETAIL.
6"
1/4" DIA. HOLE
3/4"
ASSEMBLY
CAP
SPACER
SPACER
CAP

Build a Chessboard-topped Game Table

This handsome table of poplar, ash and mahogany with inlaid board is inexpensive if you build it yourself

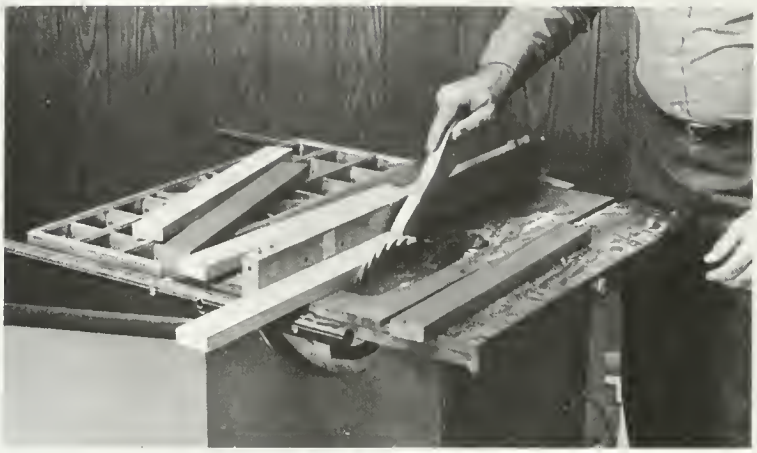
PRIMARILY A GAME TABLE which can be used for playing numerous games, this table features a solid block chessboard made of light and dark colored squares, glued together and easily made. The roomy drawer will hold plenty of games and other supplies. Leatherette panels at each side of the chessboard add to its elegant appearance.

In the game of chess, the board is placed so that each player has a white square at his right hand. The table shown is for end seating, however if you desire, you can position the board so the players sit at the long sides. The pull-out trays will hold your favorite drink or snack.

Construction of this table is simplified by making use of ready-made legs. These are available at most lumber yards and department stores and they come in various styles and sizes. For this game table, a tapered Italian provincial design 28 inches tall was selected. For the ambitious woodworker, the legs can be made without difficulty using the table saw for cutting the tapers and the router for fluting.

Assuming you are using the ready-made legs, check the lengths carefully, for although they are made by machine and should be uniform in length, there is sometimes a variation of ⅛-inch between units. If you find this so, recut the legs to make them all equal. Break all sharp edges with fine sandpaper, then set the legs aside.

The aprons are cut to size from a straight piece of poplar or maple. The two end pieces are then notched along the top edge to allow clearance for the sliding trays. The depth of the notch depends on the thickness



Chessboard is made up of alternating light and dark colored wood squares, in ash and mahogany. As shown here, strips of light and dark colored wood are cut to size on table saw.

Clamp the strips alternately, working on a flat surface. The table saw is ideal for this purpose, but be sure to protect the top with newspapers.

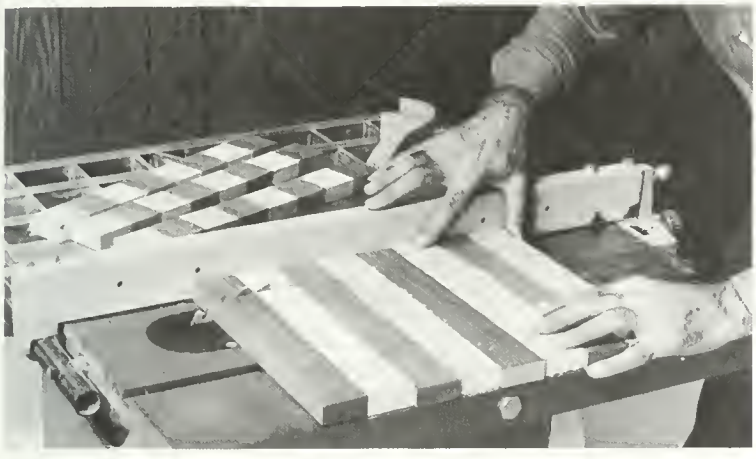
of the lumber you use. For example, one inch thick stock will be either ¾-inch thick or $^{13}/_{16}$-inch. Most pine purchased at the lumber yards will be ¾-inch thick but the hardwoods, in most cases, will be $^{13}/_{16}$-inch. For our purpose, we want the notch to be $^{1}/_{16}$-inch deeper than the thickness of the trays so that it will slide without binding. The notch can be cut in several ways, but the method shown is preferable as it results in straight smooth cuts. Lower the blade of your table saw until the teeth are below the table surface. Set the fence to the desired width of cut then position the work against the fence, and holding it firmly, turn the power on and raise the blade. A mark on the fence is used as a guide for the start of the cut. Slowly feed the work until the length of the notch is cut and use the miter gauge to cut the ends of the notch.

The decorative groove along the bottom edge of the apron is cut next. Use the router with a "V" cutter for this operation.

The legs are held to the apron with round head screws. To locate the diagonal screw holes accurately, make a drilling jig with two pieces of scrap wood. Hold the jig tightly when using and drill two holes in the ends of the three apron sections. The front drawer support is also assembled at this time. Use screws and glue at all joints.

The trays are made of the same stock as the apron. Cleats attached to the rear serve as stops to keep the trays from being pulled

Here, the miter gauge is being used to make the first cut to true-up the block. Be sure that the gauge is set square.



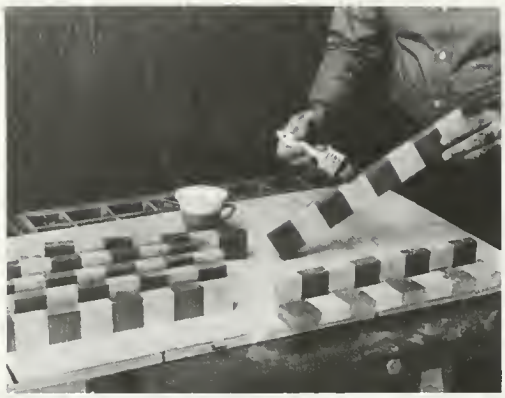
Set the fence to recut the block so each square measures 1⅞ x 1⅞-inch. A mark on fence is used as guide for start of cut.

out too far. Two cleats screwed to the underside of the top limit the closing travel of the trays so that the front edge of the tray closes flush with the apron. Runners for the tray prevent sidewise swaying. The drawer runners are assembled, then screwed to the lower part of the side aprons.

The chessboard is made up of alternating light and dark colored wood squares, in ash and mahogany. Rip four strips each of the ash and mahogany woods to exactly 1⅞-inch wide, then glue these, alternating dark and light strips as you go. If you have trouble getting the ash, any other light colored wood, such as poplar or maple, may be substituted.

When the glue has set, cut apart the striped block to 1⅞-inch widths. Remove all splinters or burrs with fine sandpaper. Next, glue to form the chessboard pattern and since all gluing in this operation will be cross-grain, be sure to size the edges using thinned down glue. Apply with brush to all edges and allow to dry about twenty minutes. Then apply glue full strength as it comes from the container, and clamp firmly. The table saw is a good place to work as the surface is flat. Protect the top with newspaper when clamping. When the glue has set, sand the surface flat using a belt sander. Start with an 80-grit belt then work up to 120 and finally finish with a finishing sander and 220 paper.

Add the trim of dark wood all around.



The end grain of the wood is very absorbent. You should first size the edges with a thinned down glue.

Reverse every other block to obtain the checkerboard pattern. Then glue and clamp, as before.

After the glue has set, the belt sander is used to true-up the surface of the chessboard. Start by using the coarse belt.

Note that dowels are used to assemble the table top sections. You should do the ends first, then do the long sides.

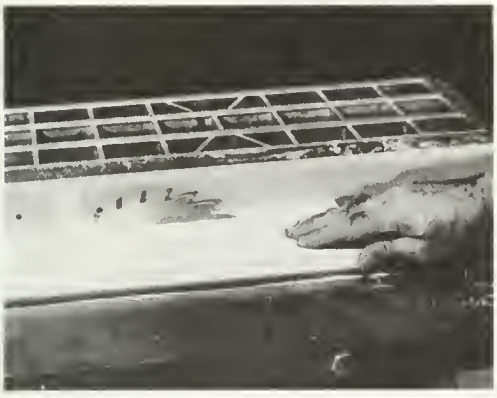
The leatherette panel is mounted independently of the ends. The reason for this is the bevel at the top edge of this panel. The small bevel is made before the panel is installed. Use a router fitted with the "V" cutter and make the bevel cut about 1/16 x 1/16-inch. This bevel will allow the edge of the leatherette to be protected. It also gives the appearance that the surface below is padded. Assemble with dowels.

Add the ends and sides, then shape the edge with the router fitted with a suitable cutter.

Again using the drilling jig, make the necessary pilot holes for mounting the top.

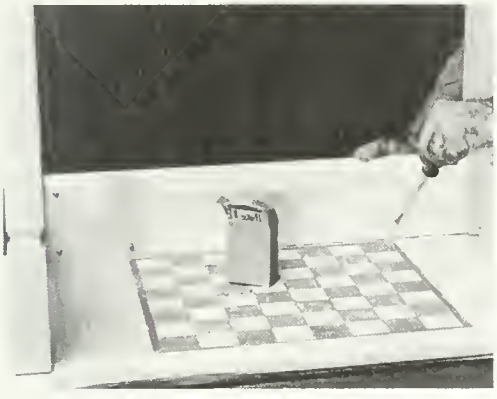
The drawer is easily made using a double front. Face piece matches the apron; sides, front, and rear are ½-inch plywood and the bottom is ¼-inch plywood. Make rabbet cuts for the rear and bottom section. Drill clearance holes for the pull screws in the front inner panel. Assemble the drawer with glue and 1½-inch finishing nails.

The leatherette panels are cut to size but are not installed until the table has been stained and lacquered. If spraying equip-

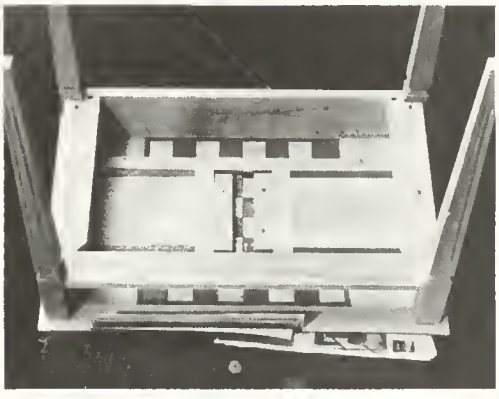


The notching for the end panel trays is done by raising the saw blade as the work is held in a stationary position.

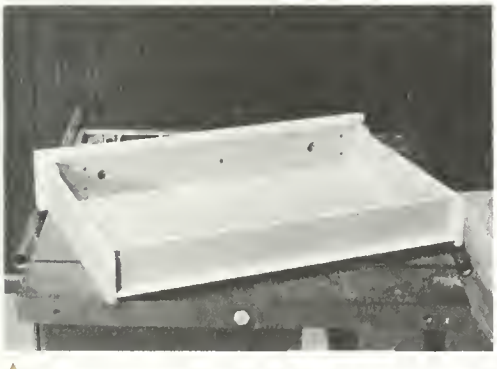
A simple jig is used to drill the diagonal pilot holes for the screws. You can make it from available scrap wood.



As shown here, apron is attached to the top with the aid of round head screws. Be sure to use glue at all the joints.

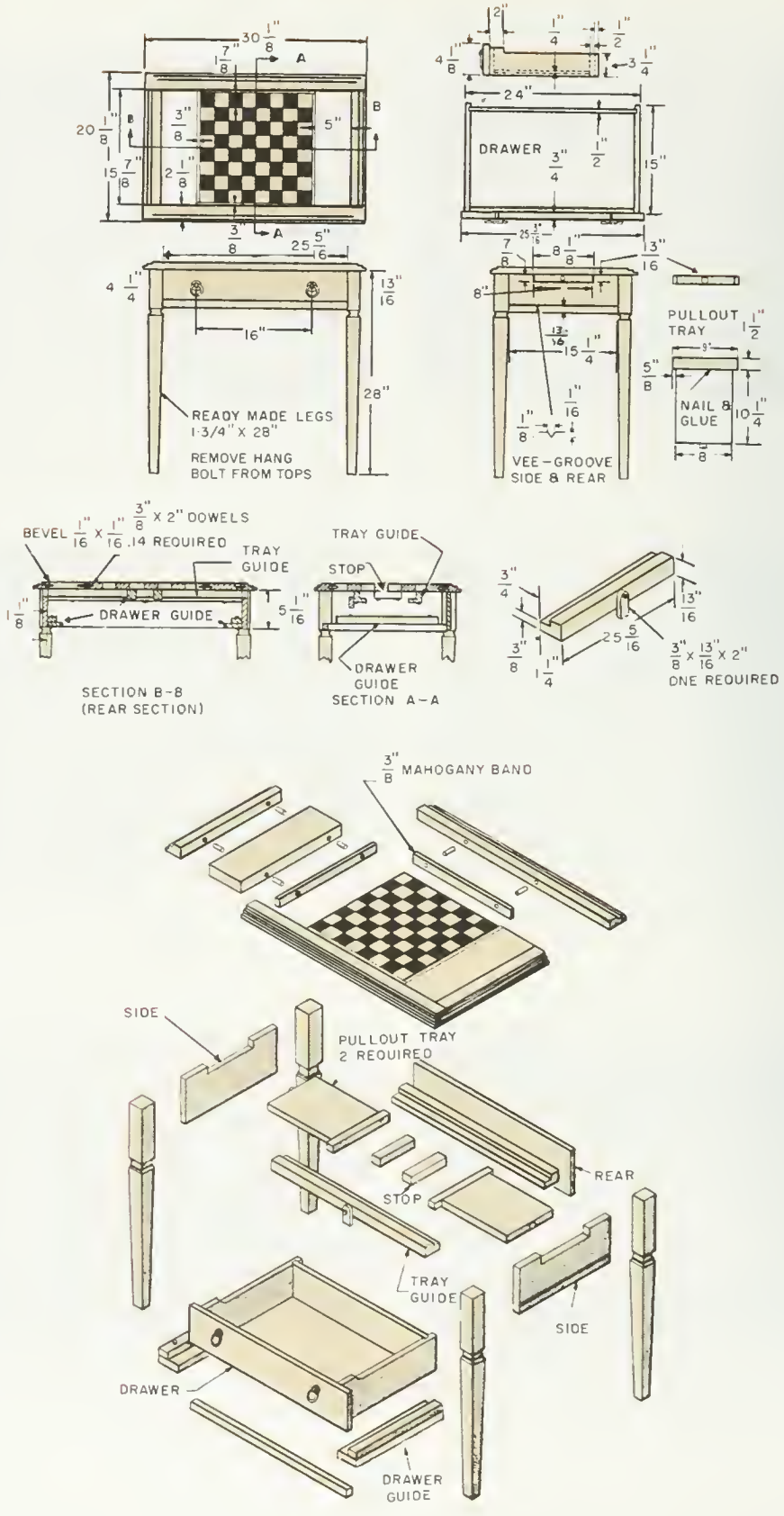


This view shows the trays in a closed position. The cleats limit the travel of the trays, to keep fronts flush with apron.



The drawer is of simple construction, using a double front. The screws in the front panel can be removed after glue sets.

Pictured is the complete table before finish is applied. Lion head pulls are used on drawer, and brass knobs on tray fronts.


READY MADE LEGS
1-3/4" X 28"
REMOVE HANG
BOLT FROM TOPS
DRAWER
PULLOUT
TRAY
NAIL & GLUE
VEE-GROOVE
SIDE & REAR
BEVEL
DOWELS
TRAY
GUIDE
DRAWER GUIDE
SECTION B-B
(REAR SECTION)
STOP
DRAWER
GUIDE
SECTION A-A
ONE REQUIRED
MAHOGANY BAND
SIDE
PULLOUT TRAY
2 REQUIRED
REAR
STOP
TRAY
GUIDE
SIDE
DRAWER
DRAWER
GUIDE

ment is used, mask off both the panel and checkerboard areas. Masking can best be done with kraft paper and masking tape. If you use a brush, you can eliminate the kraft masking over the checkerboard area—however, the edges should be taped anyway to prevent color from running into clear areas.

After color finish is completed, remove masking from chessboard area and apply clear lacquer or varnish over entire table. When dry, remove the mask from the panel area and cement the leatherette. Spray adhesive works best for this. Apply to leatherette and when the adhesive becomes tacky, apply leatherette to table surface. Work the edges into the beveled edges.

This completes the table. Add the hardware and get out the chessmen. J.C.

See also: CABINETS; FINISHING, WOOD; WOODWORKING.

MATERIALS LIST

Quantity	Size and Description	Purpose
2	13/16" 5 5/16"x15 1/4" poplar	apron sides
1	13/16" 5 5/16"x25 5/16" poplar	apron rear
2	13/16" 2 1/8"x30 1/8" poplar	top front and rear ends
2	13/16" 2 1/8"x15 3/4" poplar	top side ends
2	13/16" 5"x15 3/4" poplar	top panel
2	3/8" 13/16"x15" mahogany	band end
2	3/8" 13/16"x15 3/4" mahogany	band end
4	13/16" 1 7/8"x15" mahogany	strip
4	13/16" 1 7/8"x15" poplar or ash	strip
2	13/16" 8"x10 1/4" poplar	tray
2	13/16" 1 1/2"x9" poplar	tray rear
2	13/16" 1 1/4"x25 5/16" poplar	tray guide
2	13/16" 1 1/8"x8" poplar	tray stop
1	3/8" 13/16"x2" poplar	drawer stop
2	13/16" 1 3/4"x14 1/4" poplar	drawer runner
2	13/16" 1 1/8"x14 1/4" poplar	drawer guide
1	13/16" 4 1/8"x25 5/16" poplar	drawer front
1	1/2" 3 3/4"x23" poplar	drawer sub-front
2	1/2" 3 3/4"x15" poplar	drawer sides
1	1/2" 2 3/4"x23 1/2" poplar	drawer rear
1	1/4" 14 3/4"x23 1/2" plywood	drawer bottom
1	13/16" 2 3/4"x25 5/16" poplar	drawer support
4	1 3/4" 1 3/4"x28" poplar	legs
12	3/8"x2" dowels	
2	5"x15 3/4" leatherette	panels
as needed	#8 1 1/2" round head screws	
as needed	#8 2 1/2" round head screws	

NOTE: Also need lion pulls, brass pulls, glue, spray adhesive, stain and lacquer.

How to Maintain Garage Doors

Some repairs are better left to experts, but you can do most of the maintenance and adjustments yourself

GARAGE DOORS require periodic maintenance to remain in good operating condition. Proper door care is a simple, semi-annual job that can significantly lengthen a door's useful life and reduce major repair costs.

The door comprises three subsystems: the door itself; the suspension system, which includes roller, tracks, pivot arms and brackets; and the balance system, which includes the springs and any associated cables and pulleys. In addition, a garage door can have an electrically powered system to do the work of opening and closing, but this is not essential to the basic operation of the door.

There are two basic kinds of garage door: one piece and sectional. While both share similar features and hardware, there are also some significant differences which require specialized maintenance procedures.

The door. Before doing anything to the door, open and close it once or twice manually. If it is equipped with an electric operator, disconnect it so the door can be cycled by hand.

Open the door slowly, from inside the garage, paying close attention to the way it moves. Raise it from the center to avoid binding. It should rise smoothly, with no hesitation or jerkiness. Note any points at which it sticks and try to determine the cause visually.

Watch the rollers moving in the track. They should stay centered in the bottom and not rub the sides or try to "climb" out. Also, listen for any squeaks or rubbing and try to pinpoint the source for lubrication or adjustment.

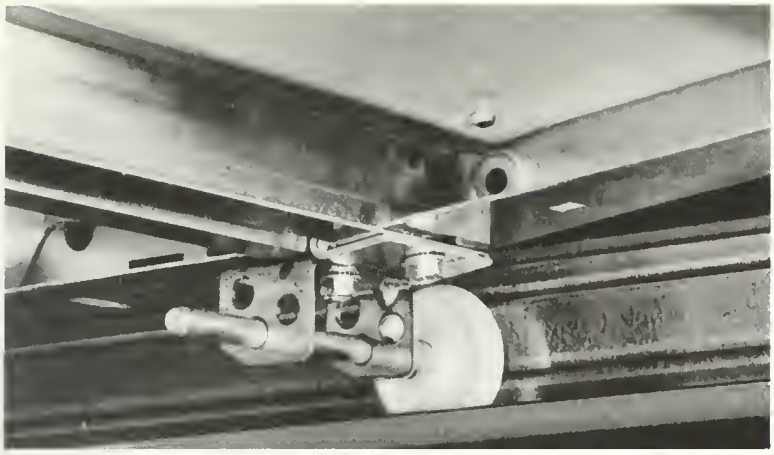
After operating the door, inspect it for rust spots, scratches, etc. which may need touch-up painting. Fiberglass doors can be washed with a mild detergent and water or simply hosed down. Other materials may require washing or painting. Do not use abrasive cleaning materials because these may damage the finish.

With wooden doors, two additional inspections are necessary. Look for signs of warping or twisting that may cause it to bind. Also, look for signs of dry-rot and loose or cracked panels in panel-type units. If any of these conditions are present, professional help will probably be required.

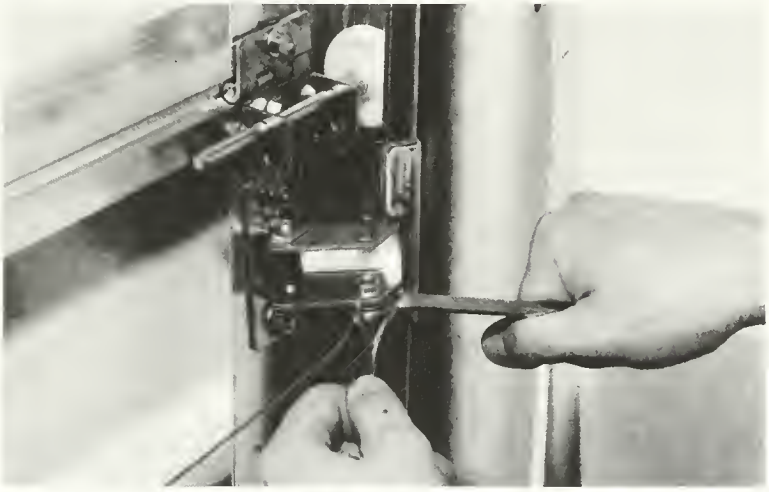
Inspect the latch mechanism to be certain it is operating properly. Systems using solid rods or chains for latching seldom require adjustment. On cable-type systems, the cables running from the handle to the latches should be taut. If they have frayed, they should be replaced. If they have stretched, they should be adjusted.

There are several systems for attaching the cables to the latches. In one common method they are secured by a bolt, nut and washer. Loosen the nut holding the washer and pull the cable taut. Then re-tighten the nut. Be careful not to pull the cable so tight it holds the latch open. The latch may be lightly oiled, but this is probably not necessary unless it is sticking.

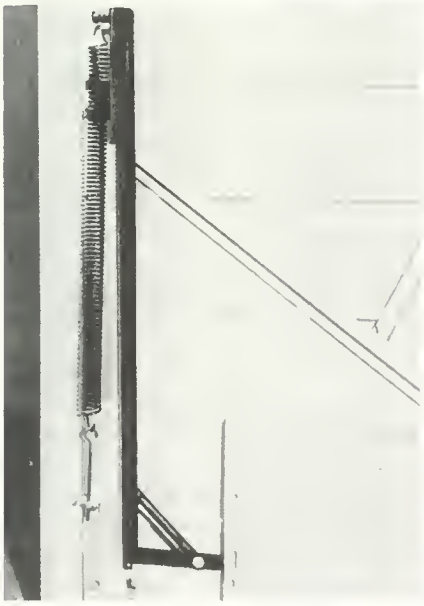
The suspension system. As with the door, begin with an inspection of the various parts



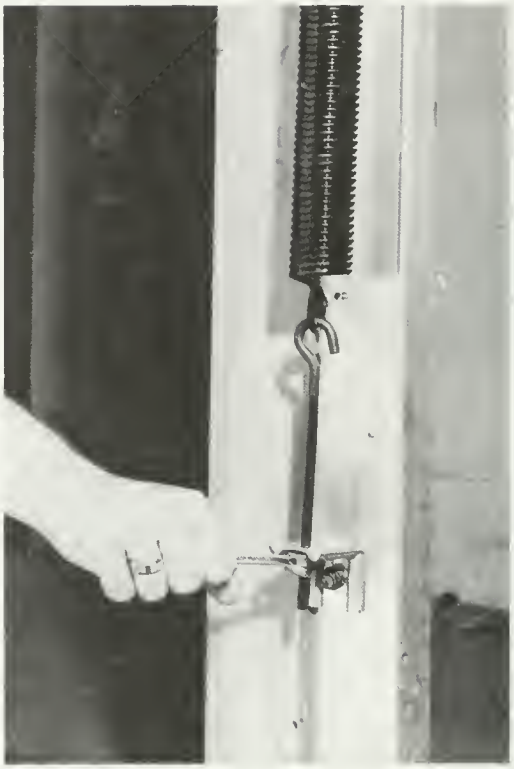
This roller is properly seated in track of sectional garage door. If roller tries to climb out of track when door opens or closes, check track alignment. Also check track for foreign objects—leaves, string, paper, etc.



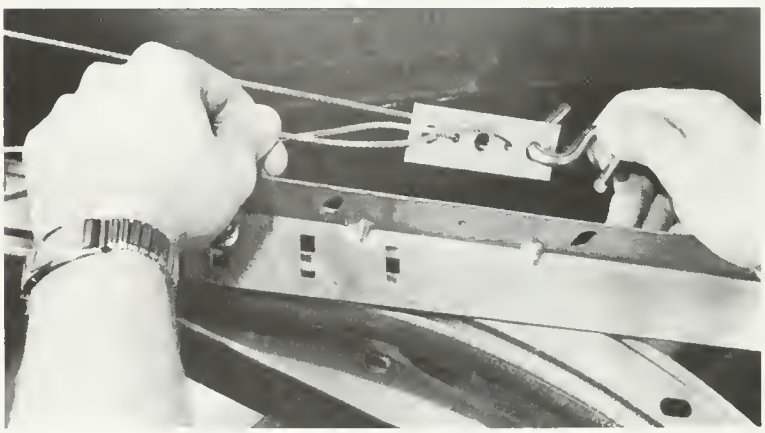
Adjusting a latch cable. These cables stretch in use and require tightening from time to time.



One piece door bracket, spring and arm in closed position (far left) and in operation (left). A worn out spring is easy to detect. With the door closed and the spring stretched, all the coils of the spring should be evenly spaced. If one is stretched noticeably more than the others, the spring is weak. Call a repair man and have him replace both springs.



Adjust spring tension a little bit at a time and keep trying door to check results. Always adjust both springs.



One type of tension adjustment for sectional door with extension springs.

This frayed cable should be replaced.

of this system. Track alignment, in particular, is very important to a smoothly operating door. The tracks must be parallel to each other and perpendicular to the front wall. In addition, they should be the same height so that the door is level from side to side in the fully open position.

The most common symptoms of track misalignment are "climbing" and rubbing by the rollers while the door is moving. This results in increased operating resistance. If either condition was noted when the door was opened and closed, check the track alignment.

Often, the track hanger straps are bent or twisted as a result of being struck by something in the garage. If this is the case, they should be straightened. In doing so, however, be certain to maintain proper track alignment.

If the tracks themselves are bent or dented, they will probably have to be replaced. This is a job for a qualified serviceman since it requires partial dismantling of the door system.

While inspecting the tracks and hangers, look inside the tracks for foreign materials that may be lodged there. Twigs, leaves, paper and bits of string sometimes get into the tracks and can cause the rollers to stick or bind.

Next, lubricate all pivot points on the arms and brackets of one piece doors. Use an SAE 30 weight or heavier oil sparingly. Over lubrication can cause as many problems as no lubrication at all. One or two drops should be sufficient.

The single most important point of lubrication on a one piece door is the arm pivot pin on the wall bracket. The entire weight of the door is supported by this pin each time it is opened and closed. If the pin becomes worn or loose, the bracket can twist while the door is being opened placing excessive stress on the roller, tracks and arms.

The final step in suspension system maintenance is to check the tightness of all fasteners on the door, track and opening hardware. Be certain to include the lag screws holding the jamb brackets in place on one-piece doors. If the brackets have become "cocked" on the jamb, they should be straightened before re-tightening the lag screws. On sectional doors, check the tightness of the track brackets lag bolted to the jamb, and the bolts and brackets joining the horizontal and vertical track sections.

The power system. The garage door is the largest single piece of movable hardware in the average home, with many weighing between 200 and 300 pounds. The ease with which such a heavy object can be lifted is a result of the balance system built into the door. This system, comprising the springs and their associated cables and pulleys, stores the energy generated when the door is closed and uses it to help in lifting the door. The springs also help control the rate at which the door closes, preventing it from crashing down.

As a result of their function, the springs are always heavily loaded when the door is closed. Moreover, if removed while the door is open, there is a danger that the door may fall uncontrolled causing damage or injury. Because of the danger involved, most spring maintenance operations should be undertaken only by a trained serviceman.

There are two exceptions to this general rule. These involve minor tension adjustments to the springs on one piece doors and to extension-type springs on sectional doors. Under no circumstances should the homeowner attempt to adjust torsion type springs used on sectional doors.

The need for spring adjustment is usually reflected in the amount of force needed to lift the door. Do not, however, adjust the springs until all other possible causes of hard opening have been checked and eliminated.

Track alignment is probably the major cause of opening difficulty. A tension adjustment will often overcome the resistance

caused by a misaligned track, but this does not solve the underlying problem. Increasing the spring tension merely applies more force to the door, increasing the strain on rollers and other components and quite possibly resulting in an early failure.

One very common reason for spring adjustment is that the door has been painted. On a typical 16-foot door, painting can add as much as seven pounds to the overall weight. That extra weight requires additional force when lifting the door. In this case, a slight spring adjustment will offset the extra weight and return the door to smooth operation.

With wooden doors, seasonal weight variations may occur as a result of moisture absorption. They may necessitate more frequent spring tension adjustments in these units.

If a tension adjustment is required, it is a relatively simple operation on one piece doors and sectional units with extension-type springs. Open the door fully and prop it so it cannot fall accidentally.

On one-piece doors and some sectional types, one end of the spring is attached to an eye-bolt or similar device, which runs through a bracket and is held by a nut. By tightening the nut, the spring is stretched, increasing the tension on it. Both springs should be adjusted the same amount to maintain proper door balance.

Make the adjustment gradually in increments of ½-inch. Check the door operation after each adjustment until the proper amount of lifting effort is obtained.

On sectional doors, the tension adjustment is sometimes made by shortening the length of the cable attached to the spring. In this case, the door must be opened fully and propped so it cannot fall. The cable is then disconnected and shortened.

Depending on the particular door involved, this is done either by changing the position of a clip that connects the cable to the track, or by re-tying the cable to a special bracket. If the original installation instructions are not available, it is advisable to consult the door manufacturer before proceeding.

The only other items of balance system maintenance that should be performed by the homeowner involve visual inspection of the springs and any cables used with them. Both springs and cables eventually wear out with use, but sometimes give a visual signal before failing.

With cables, this signal is fraying—particularly at points where it bends over pulleys—and general physical deterioration. Either condition indicates a weak cable which should be replaced.

The best practice is to replace both cables, although only one may show wear. If one of them has experienced enough wear to weaken it, then the other is probably very close to that point as well.

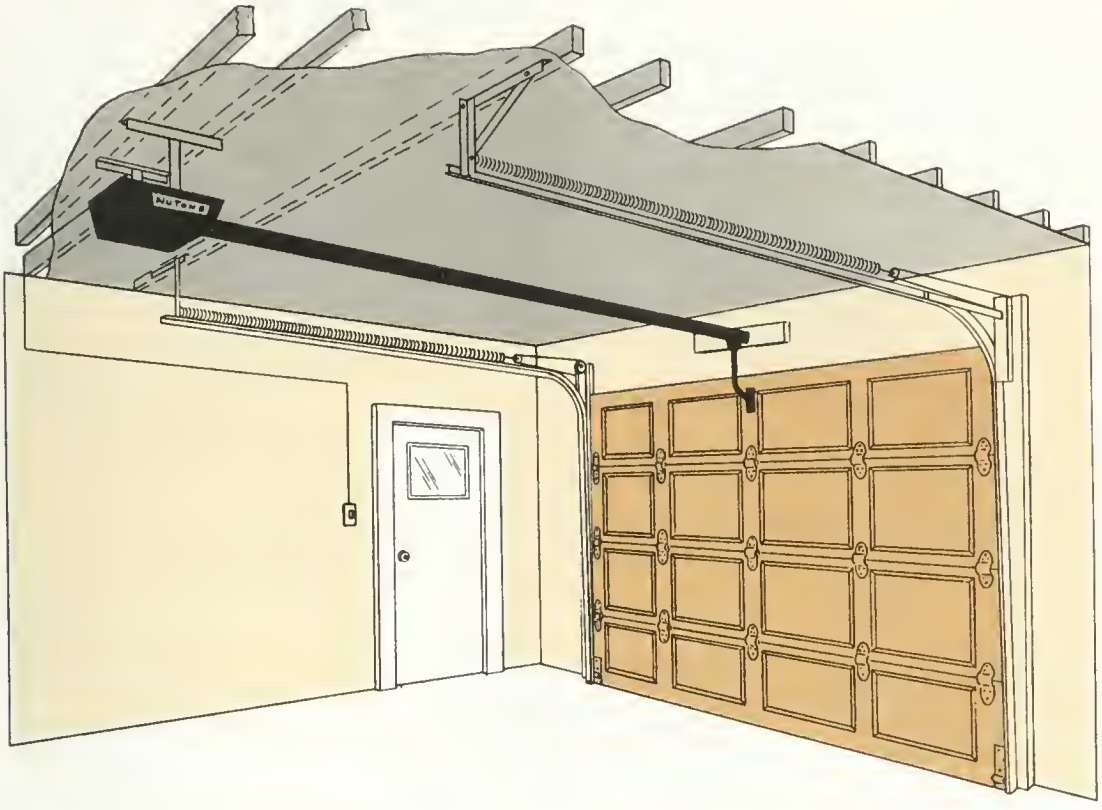
Cable replacement should be done by a trained serviceman. There is a certain amount of danger involved since the springs must be disconnected to replace the cables. This is especially true of torsion-type hardware where serious injury can result from improper maintenance and service procedures.

The danger signal for extension-type springs is uneven spacing of the coils when the spring is stretched. Normally, the weak section will stretch more than the rest of the spring, increasing the distance between the weak coils. This is a problem that is very easy to detect with a visual inspection while the door is closed.

As with cables, springs should be replaced in pairs. Again, this is a job for a trained serviceman since there is a certain amount of danger involved.

Modern garage doors are designed and built to provide many years of reliable, trouble free service. Periodic inspection and maintenance of door system components will help insure delivery of this service.

See also: GARAGE REMODELING.



Install an Automatic Garage Door Operator

In addition to convenience, this device will add value and security to your house

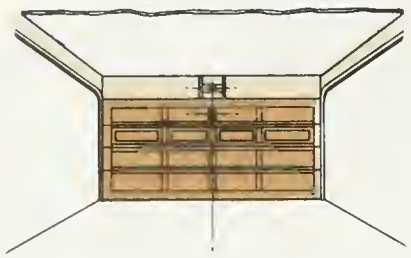
AN AUTOMATIC GARAGE DOOR operator is a great convenience and increases the value of your property and the security of your house.

Once you have decided on a unit—be sure to compare safety features of various types—you can either have it installed by an expert or do it yourself. Manufacturers include detailed instructions with each piece of equipment.

Before starting the project, make sure the garage door is in good condition and the counterbalance system is adjusted. You can make some of these adjustments yourself. If spring, cable, or other dangerous work is required, call in an expert. The energy stored in a garage spring packs a powerful wallop. So does a falling garage door. Play it safe.

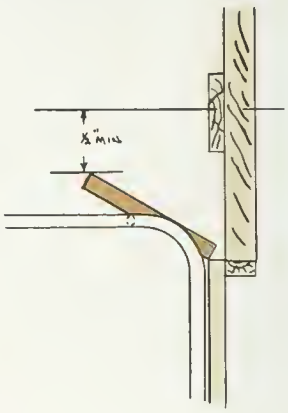
There are two main types of doors: sec-

tional and one piece. The two usual methods of counterbalance are torsion spring and extension spring. The torsion spring system consists of springs mounted on a continuous shaft or rod over the door header. The extension spring system con-

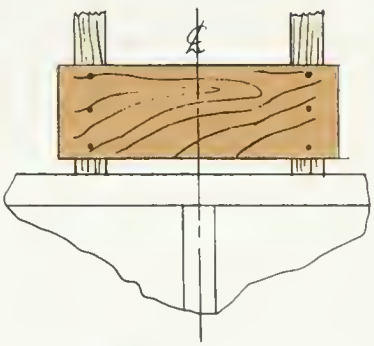


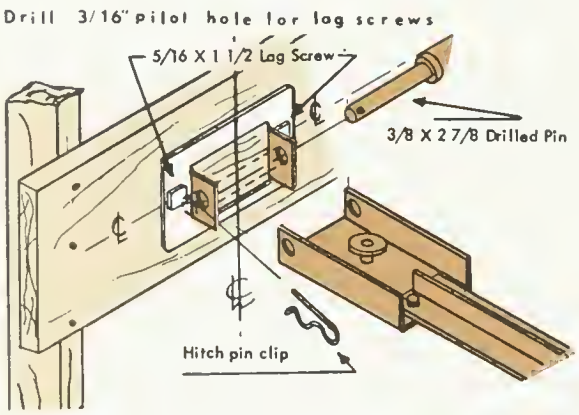
When installing an electric garage door operator, the first step is to measure the door exactly and make a vertical line along the center. Extend the line to the wall above.

Find the highest point of door travel, then mark the wall over the door on the centerline at least 1/2-inch higher. The horizontal mark can be a little more than 1/2-inch—but no less. Make sure you use a level.

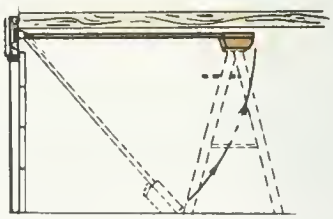


If a sturdy base is not already in place, install a 2 x 4 as shown, and transfer the centerline to the 2 x 4. Remember, this point receives all the forces required to open and close the door.

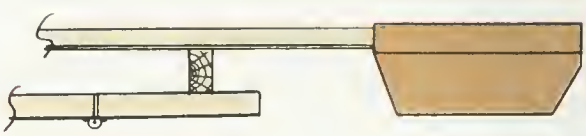




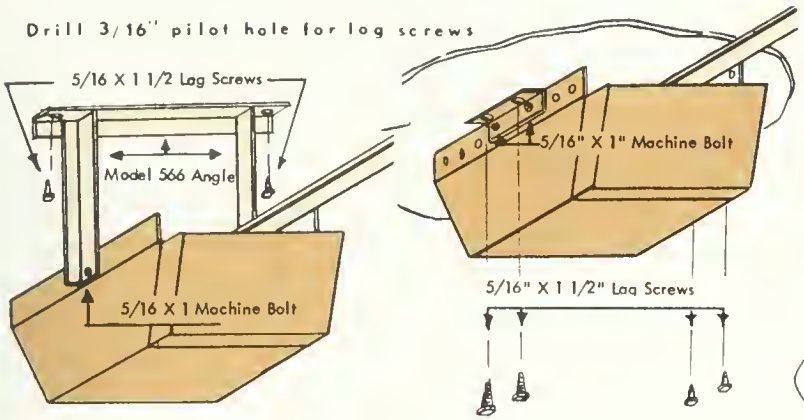
Lift the motor end into position on the centerline and support it with a stepladder. Use scrap wood to temporarily shim it into position.



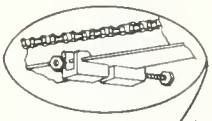
Install the front wall bracket with the mounting holes centered on the horizontal lines and the bracket centered on the centerline. With the garage door closed, lift the rail end of the door operator and fasten the end to the bracket. Leave the motor end on the floor.



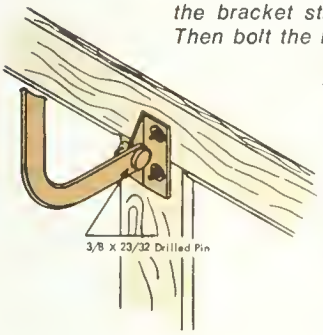
Install an Automatic Garage Door Operator

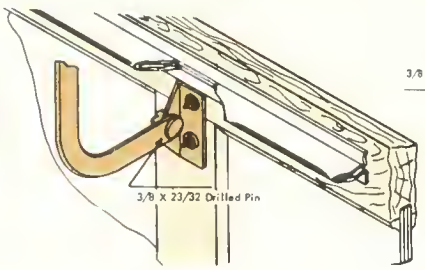

Drill 3/16" pilot hole for lag screws
5/16 X 1 1/2 Lag Screws
Model 566 Angle
5/16 X 1 Machine Bolt
5/16" X 1" Machine Bolt
5/16" X 1 1/2" Lag Screws

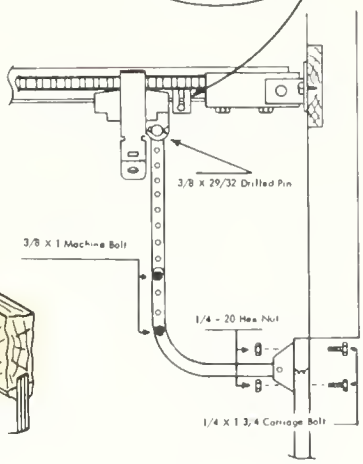
The method of hanging the operator from the ceiling will vary with the type of garage construction and the type of operator. Two common methods are shown here.

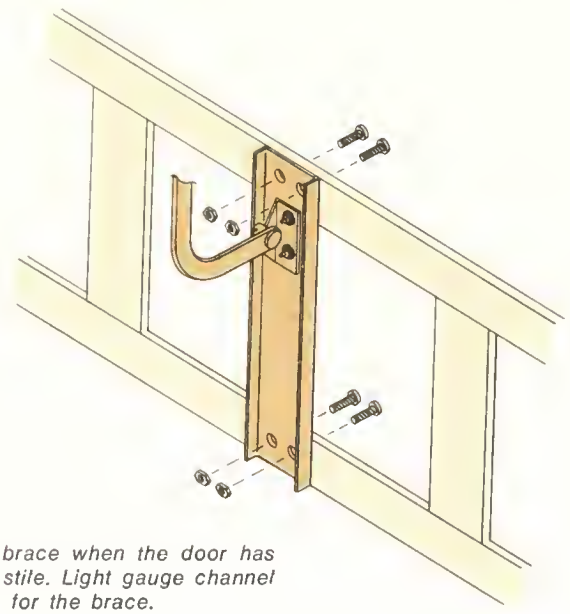


Assemble the door arm and door bracket as shown, adjusting the length of the arm so that the bracket strikes the upper rail of the door. Then bolt the bracket to the door.

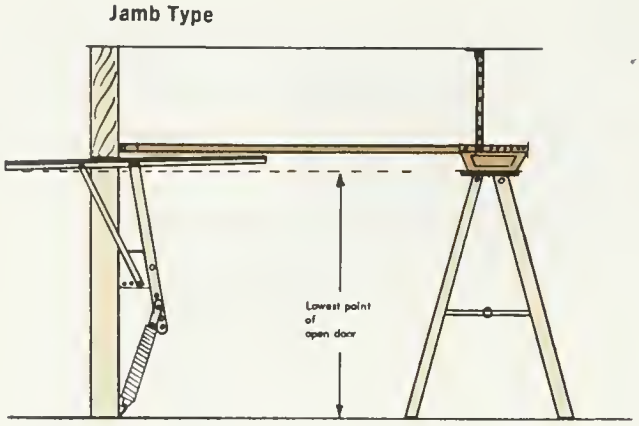






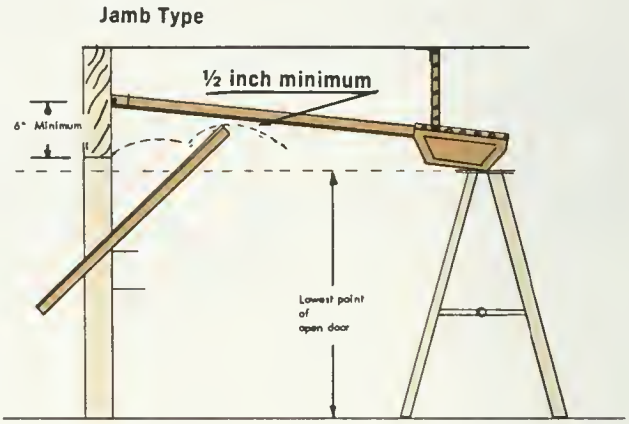


Use a brace when the door has no center stile. Light gauge channel is suitable for the brace.



To install an operator on a jamb-type door, first lay the T-rail on the top of the open door and support the motor end in position on the top of a step ladder, using scrap wood shims if necessary to keep it level with the lowest point of the open door. Then hang the operator from the ceiling, but do not tighten bolts all the way.

Close the door and allow the T-rail track to rise to the highest point as the door closes. When the door reaches this location, mark the point on the wall centerline at the end of the rail. Temporarily fasten the end of the track at least 1/2-inch above this point. It must be at least 6 inches above the door. When the temporary fastening is made, open the door and make sure that the highest point of travel clears the track by at least 1/2-inch. Then, attach the track to the wall in the same way as for a sectional door and tighten the bolts holding the motor end in place.



sists of a long, heavy-gauge spring mounted over each horizontal track section.

The individual from whom you buy the automatic garage door operator may want to know which counterbalance system you have. Ordinarily, the operational differences between these two systems are minor, and are of little consequence to the installation of the garage door operator.

If you decide to install the door operator yourself, it will save time if you have the necessary tools for the project collected in advance. The following will undoubtedly be needed: Wooden step ladder (seven feet high), reversible impact wrench and rachet wrench with socket set, extension cord, hammer, wood saw, hacksaw, electric drill, nut drivers, screwdriver, level, pencil and nails. Lumber may be needed to reinforce the header—2 x 4 inches by 3 feet long.

Carefully measure the exact width of the door to determine the center. Mark a plainly visible vertical line above the door header. Next, locate the highest point of door travel, and mark the wall over the header with a horizontal line, ½-inch absolute minimum above the highest point of door travel. The line may be placed slightly higher if adequate room is available, but never less than ½-inch. Be sure to use the level to place

this line accurately. If suitably sound woodwork is not already in place, install the 3-foot length of 2 x 4 centered exactly above the header and transfer door centerline onto the block.

Remember, all of the forces required to open and close the door are applied to the front mounting attachment so it must be safely secured.

The automatic garage door opener should have a steel housing completely surrounding the operative mechanism for protection. This operator will weigh more than 50 pounds. The radio control receiver will probably weigh less than 15 pounds and will be installed later.

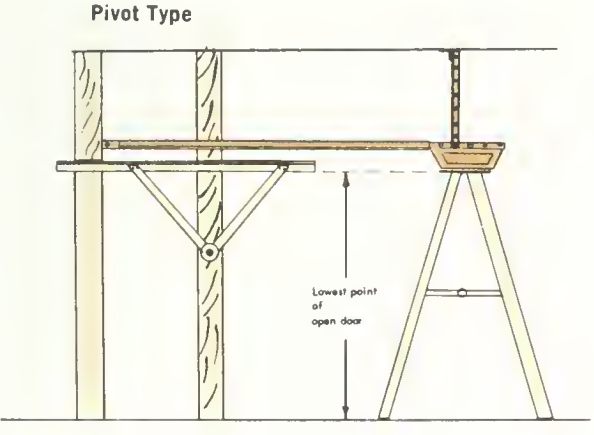
The operator can be lifted and supported with the stepladder. Open the door to full open position with the door now supporting the operator. Temporarily shim the operator to a level position on the center line of the door. The actual hanging of the operator will vary with each garage and hardware. At this point you are ready to follow the instructions supplied by the manufacturer.

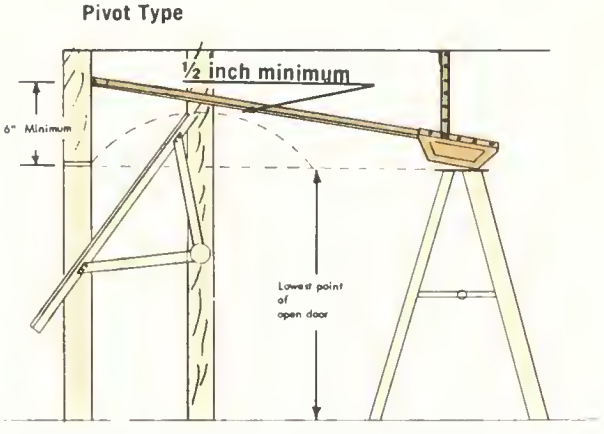
The radio transmitter is installed on the sun visor or dashboard of the automobile with the radio receiver being installed close to the operator in the garage. The antenna on this receiver is mounted with antenna pointing downward.

These radio transmitter/receiver sets vary widely in price, but from a security standpoint, choose a well engineered transmitter/receiver.

If the house is located in a densely populated area, a careful selection will be particularly necessary. An inexpensive transmitter could easily trigger a large number of garage doors within a few blocks. If yours will trigger other doors, there are many less expensive sets in the area which can trigger yours.

Choose an operator with an assigned frequency others cannot open. The finest transmitter available now relays a precise combination of three signals to the receiver. The use of three instead of one reduces the possibility of false operation. One signal is radio frequency. The other two are engineered by a complex sounding process so that the tone signal varies in pitch in a specific pattern at a time-based rate. A good radio transmitter will have as many as 24





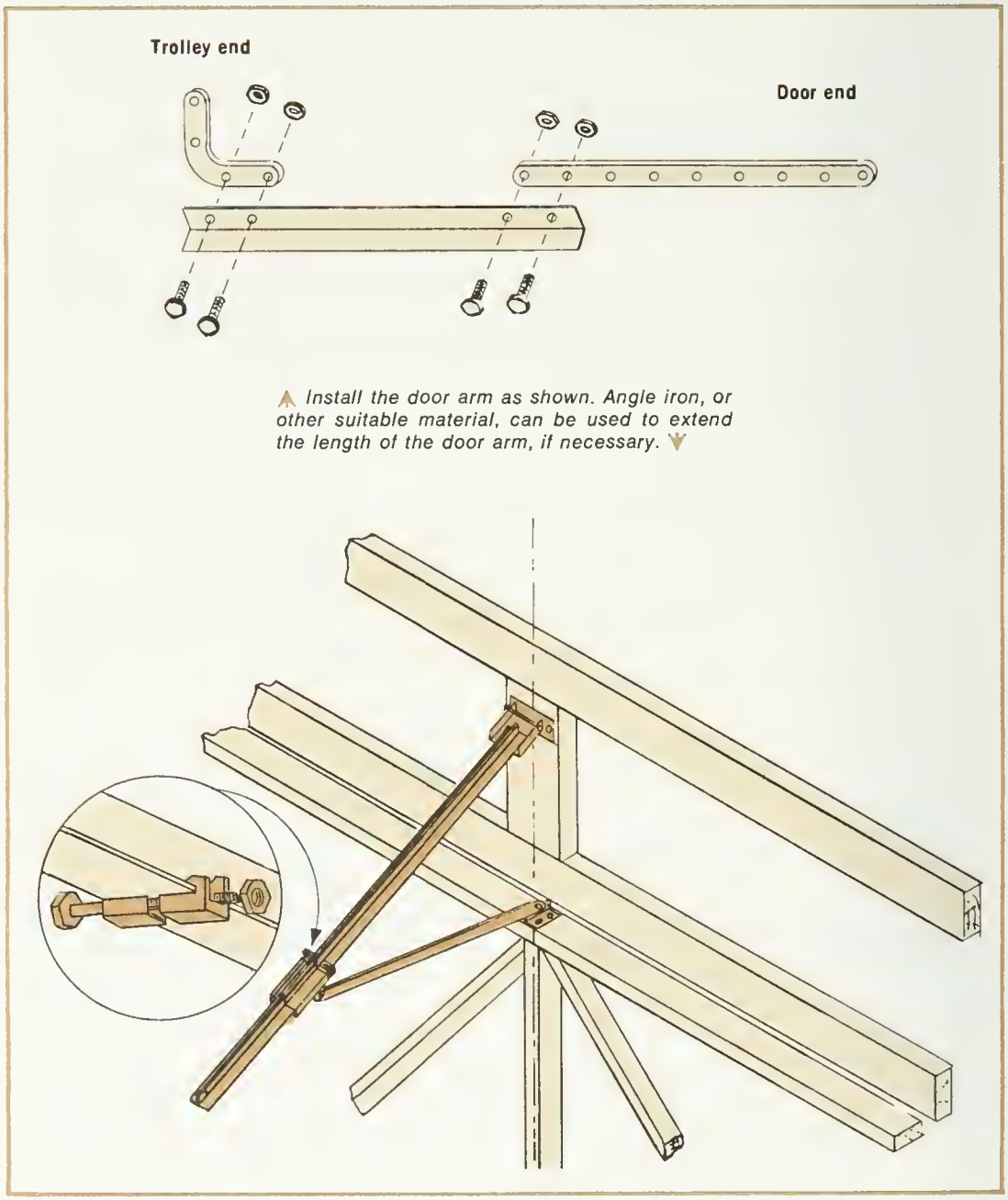
To install an operator on a pivot-type door, follow procedure for a jamb-type door.

stock frequency combinations available, and normally the manufacturer will have additional frequency assignments if needed.

If you are in a highly populated area you will undoubtedly find that a less expensive two-code signal transmitter will cause problems even if it has 24 stock frequency combinations.

Only U. L. listed, FCC approved radio transmitter/receiver should be considered for the security of the family and property.

See also: GARAGE REMODELING.



▲ *Install the door arm as shown. Angle iron, or other suitable material, can be used to extend the length of the door arm, if necessary.* ▼

➤ *One way to do it. This room was converted into living space from a garage. Instead of a painted wall, you might use pre-finished paneling.*

Convert Your Garage to Living Space

Here's how to do the whole job, from planning to finishing, including how to cut and frame openings for doors and windows and how to install electric wiring and heating equipment

WANT ANOTHER ROOM in your house which will be secluded, yet more convenient to reach than your basement or attic? You can get it in your garage, if it's the attached type or an integral part of the house, at far less cost than construction of an addition.

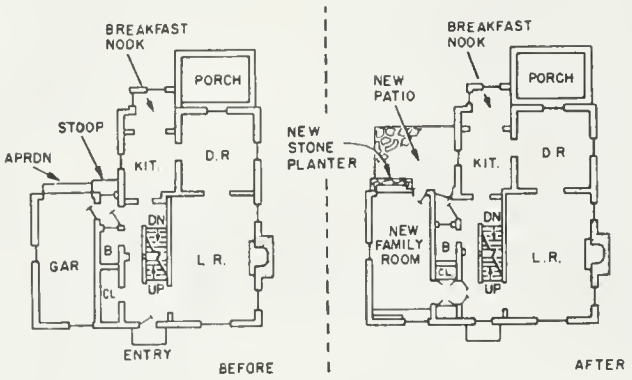
Plan ahead. Preliminary planning is by far the most important step in converting a garage to a family room or other living space. Take time to orient the new room to the rest of the house and the outdoors so it will best serve its intended purpose.

First measure your garage space and, at least, those rooms adjacent to it. Jot your measurements on a rough sketch as you go along, including exact location and size of all existing windows and doors. If you have or can get a copy of the original plans of your home, you will be spared this work. Even so, check actual measurements against those on the plan—there may be some deviation.

Now transfer your measurements to a scale plan, using graph or plain paper. If the latter, scale your drawing to ¼-inch per foot of actual measurement. When the scale plan is finished—and it need only be accurate, not well drawn—study it in relation to the way you live in your house now and the extra space and conveniences you want. Ask these questions:

1. How can the extra space fit into what will actually be a larger house than you now have?
2. Where should the room be entered? Should it be a dead end in the house traffic pattern or will the room's function be such that through traffic won't disturb activities within the room?
3. Should there be an outside entrance?
4. Are present windows adequate or should they be enlarged for a better view and to admit more light?
5. Should the garage door be replaced

garage stretch: see shelves
garbage disposal: see trash compactor
garden: see landscaping
garden cart: see carts



with a bank of windows, view window, floor-to-ceiling glass or sliding doors?

6. How many and what kind of built-in storage units do you want?

7. Where will you need electrical outlets —for reading, TV, projector, etc.?

When considering these, study your plan to see if some storage units you need for activities can be located outside the new room in existing closet, hall or other space. Trace your first drawing and then sketch in the additions and changes you envision.

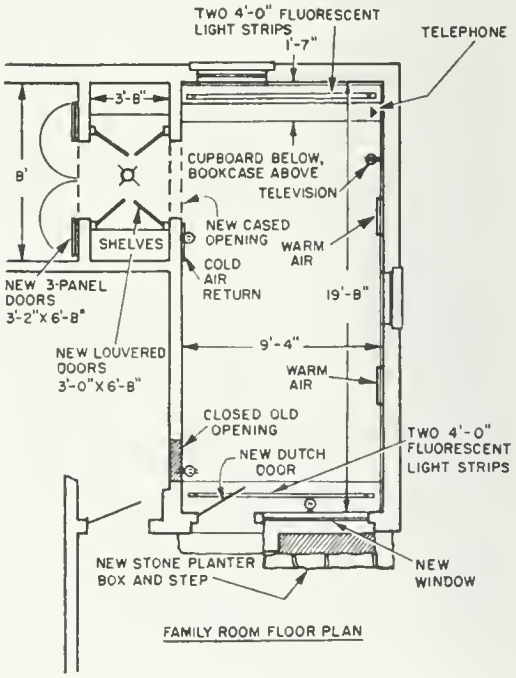
As your plans take shape, transfer them into full scale by marking locations of new doors, built-ins, windows, electrical outlets and other additions on floor and walls. "Use" the garage as a family room by walking around in it as if the conversion had already been made to get the feel of the room and to determine further changes. Put them in your scale plan and you'll be as certain as possible that the finished project will enhance your living and the value of the house.

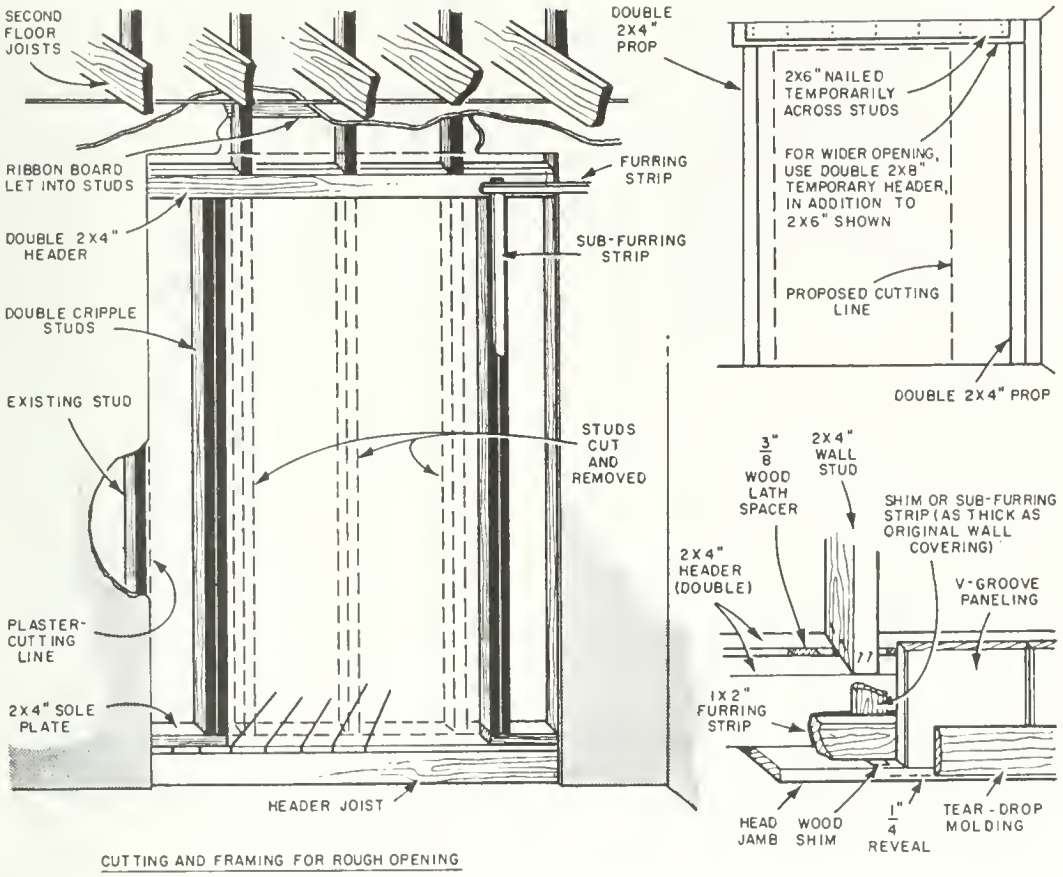
Now you're ready to take your plans and sketches to dealers for material quotations, schedule labor you may need in addition to your own, arrange for financing if desired—and start work. Illustrations on these pages follow a typical project because door, window, floor, wall, ceiling and closet changes were made, built-ins added and heating and wiring extended. You may apply many details to your own projects.

Stripping down the garage. Rebuilding will be easier if you take away at one time all parts not included in the new use. To remove an overhead-type garage door, release and detach springs first; brace door temporarily while you detach and remove tracks, then dismantle door, panel by panel.

If hinged passage doors are to be re-used along with original casing and trim, remove them this way: Take out hinge bolts to detach doors. Carefully pry loose trim molding on each side, using a putty knife first and then a wide-blade chisel with a wood block as a fulcrum. (Pry up and remove threshold—if outside door). Insert a hacksaw between door jambs and wall studs to cut all nails holding the frame, then wiggle the entire door frame out intact if you can —with hinges and striker plate attached.

To remove a window intact, pry off interior trim first, then either cut the casing nails or knock them all the way through the frame with a hammer and a slender nailset. The window will most likely pull along, still in the frame, as you pry exterior molding away from wall sheathing.





CUTTING AND FRAMING FOR ROUGH OPENING

Carefully pry off all other trim and molding pieces you plan to re-use and store them safely.

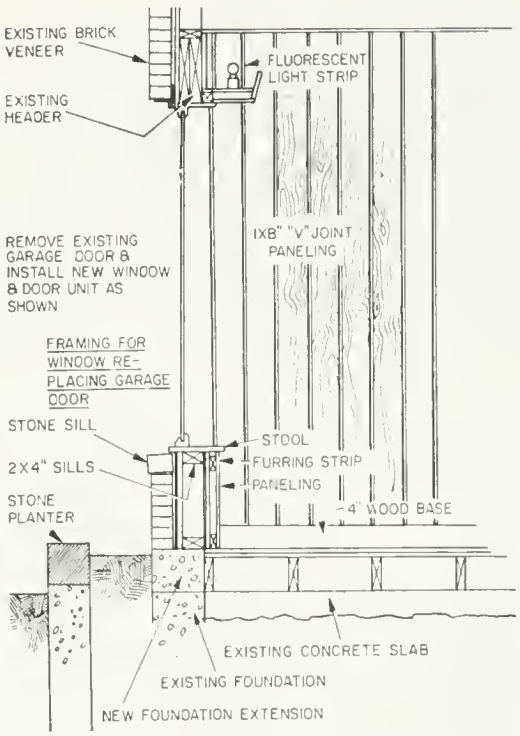
In this garage project, a ceiling light was removed, and switch, wires and ceiling box pulled out for re-use. The remaining opening was closed and replastered. If you do such removal yourself, trace the hot wire to its origin at fuse or circuit breaker box, or junction box; then pull main switch and detach the wire at the power source *before* touching work to be removed.

Finally, break up and remove the concrete apron or sloped slab at the garage door. Use a cold chisel and heavy hammer to score concrete in sections small enough to lift and cart away. Break slab at score marks with a heavier sledge. You may have to dig under the slab. Concrete has tremendous impact (straight down) resistance, but very little resistance to being broken off—like a cookie.

Rough Framing. When you select doors and windows, obtain dimensions for the rough openings from the dealer. This is important; measurements of finished frames to be inserted into the openings often differ a little from those specified in plans.

If garage side of walls is unfinished, you'll have little difficulty cutting and framing openings. If walls are finished and plastered, more work is involved. Here's the procedure used to cut and frame a double-door opening from front hall into the new family room.

Determine exact location of door on



house side of the wall. Mark on wall the center of proposed door, then measure out and mark opening to be cut, using this formula:

Width of door (two used, 1 ft. 8 in. each)	3 ft. 2 in.
Thickness of door frame side jambs (¾ in. each)	1½ in.
⅜ in. "wiggle room" on each side so frame will slip easily into rough opening (space to be shimmed later using ⅜-in. lath)	¾-in.
Total width	3 ft. 4¼ in.

Measure half the total from each side of your previous center mark and mark vertical cutting lines. Add these items to determine height at which to cut plaster:

Height of standard door	6 ft. 8 in.
Head jamb thickness (standard)	¾ in.
Top wiggle room (shimmed later)	⅜ in.
Total height	6 ft. 9⅛ in.

Cut the opening in plaster or other wall covering carefully, avoiding wall studs and any wiring or piping inside the wall. Try to avoid jagged edges so that molding to be applied will cover without need for patching.

For the fastest way to cut, use a portable power saw with guide set to exactly the depth of plaster plus lath. Unless you use a special hard material cutting blade, sharpen the blade a bit after cutting.

If you use an ordinary saw (it may also need sharpening afterward), begin by boring a hole in each upper corner of the proposed opening. After starting cut with a keyhole saw, you can switch to an ordinary crosscut saw. Take short strokes until you have cut enough to break away plaster and search the wall cavity for piping or wiring.

Opening on garage side of the wall cannot be cut to exact size since you need room to cut existing studs and insert new rough framing. So cut out the plaster beyond sides of the proposed rough opening to the next wall stud. To determine height of the plaster cut on this side, use the formula previously mentioned but add depth of the header. In this case, a double 2 x 4 header was sufficient for the 3-foot 2-inch finished opening width so 3⅝-inch (actual width of a 2 x 4) was added to the formula, giving a height of 7 feet ¾ inches.

If your span exceeds 3 feet 2 inches in a load-bearing wall of a two-story house, however, use a double 2 x 6 header up to 5-foot width. If opening is still wider, ask your dealer, an architect or engineer to compute the size for you. For each increase in width of the header (over a 2 x 4), plan to cut the studs that much higher.

After cutting away plaster, nail blocks to studs as bases for the shimming. Brace studs to be cut by temporarily nailing a 2 x 6 across them right over the cutting mark. Use 16d nails but do not drive them all the way "home" so that you can pull them out later with the claw of a crowbar. The nails will hold studs firmly and help support

structure above during the cutting. If it's a wide opening, prop up the ceiling temporarily on both sides of the wall.

Next, cut the sole plate (horizontal 2 x 4 on which studs rest) to correct rough opening width and install double cripple studs to serve as permanent rests for the header.

If you plan to retain the original wall covering, you will need to replaster any broken wall area back to the rough opening. However, if you plan to panel over the old wall, merely shim out the new framing to the thickness of the original plaster so that furring strips for the paneling have a level nailing base.

Cut window openings the same way, except that you figure from the top down. Obtain overall sash and rough opening sizes from the dealer, then mark wall at height to correspond with top edge of door trim so that window will finish at equal height. Work down from that mark, using details provided by the manufacturer to determine where to cut plaster and studs to insert the header. Locate lower edge of header, then measure rough opening height downward from that to locate top edge of the 2 x 4 sill.

Replacing garage door opening. When filling in the garage door space, much work is already done because of the header spanning the existing opening. Rough framing consists of a 2 x 4 sill or sole plate (sill rests directly on the foundation; a sole plate on the floor or subfloor), cripple studs, window sill and furring. If header is too high, as with an 8-foot high garage door, either fur down from it or install a false header below it.

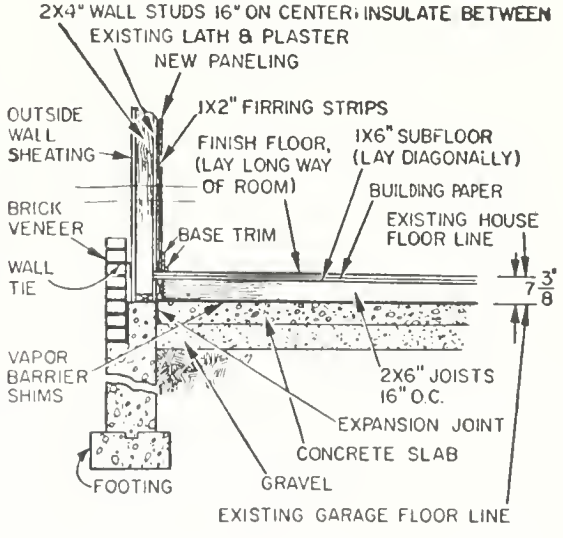
In this garage, an extension to the concrete foundation was poured. Building codes permitting, you could instead lay the wood sill on the existing foundation, frame up to the window opening, and then cover outside of the framing up to 6 inches above grade with moisture-resistant fiberboard—the kind used to insulate the perimeter of slab-built houses. If you do this, use treated lumber to forestall moisture troubles.

To close up an existing door opening, simply fill in 2 x 4 framing, add insulation where needed and install a wall covering furred out to a thickness equal to the adjoining cover. You can reframe such an opening with two studs and the necessary length of sole plate.

You are now ready to complete the basic conversion of an integrally attached garage to a family room.

When all openings in your former garage space have been relocated and rough-framed where you want them in the new room, your next step is to prepare for the flooring.

Installing subflooring. Once you decide on the surface, consider the installation problems involved. Three conditions that may cause extra work are excessive unevenness in the concrete garage floor; difficulty in matching height of the proposed new floor to that already existing in the house, and possible need to pass heating or plumbing under the floor.



FLOOR CONSTRUCTION

To determine the variation in height between the two floors, extend a carpenter's level from the edge of the house floor at the inside entry and measure distance from lower floor up to the level. This difference was 7⅜-inch in the garage conversion de-described here. The difference was made up with 2 x 6 joists (dressed depth 5⅝-inch), hemlock subflooring ¾-inch thick and prefinished oak flooring, also ¾-inch thick.

The total 7⅛-inch height was still ¼ inch short. A fraction of the difference was taken up by a vapor barrier of 90-pound asphalt roll roofing installed over the concrete and building paper over the subfloor. Cedar shingles shimmed as needed under the joists took care of the remaining space.

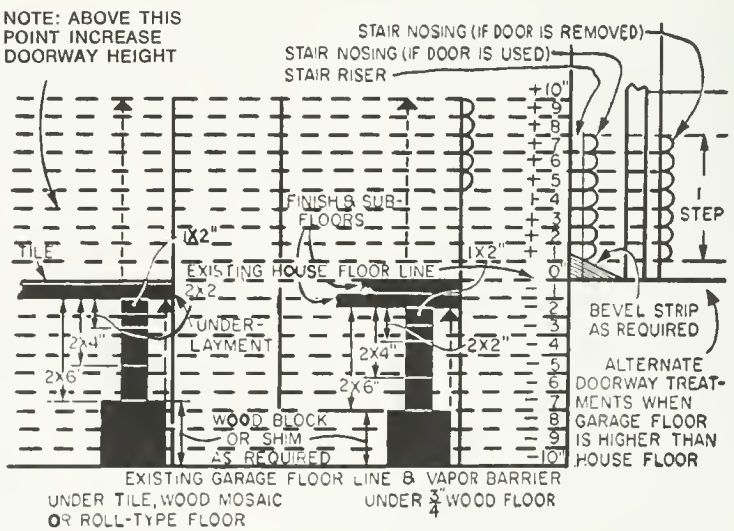
You might use polyethylene film as a vapor barrier and choose between 15-pound felt and red resin paper for the building paper—or omit it altogether—over the subfloor.

Alternate methods to suit various floor heights and types are shown in an accompanying drawing. When using 2 x 4 or larger joists on the garage floor, compensate for any unevenness by cutting shims or wood blocks of varying thickness, as required. Wood blocks spaced 6 feet apart under 2 x 6 joists (or 4 feet under 2 x 4s) are more economical than larger joists.

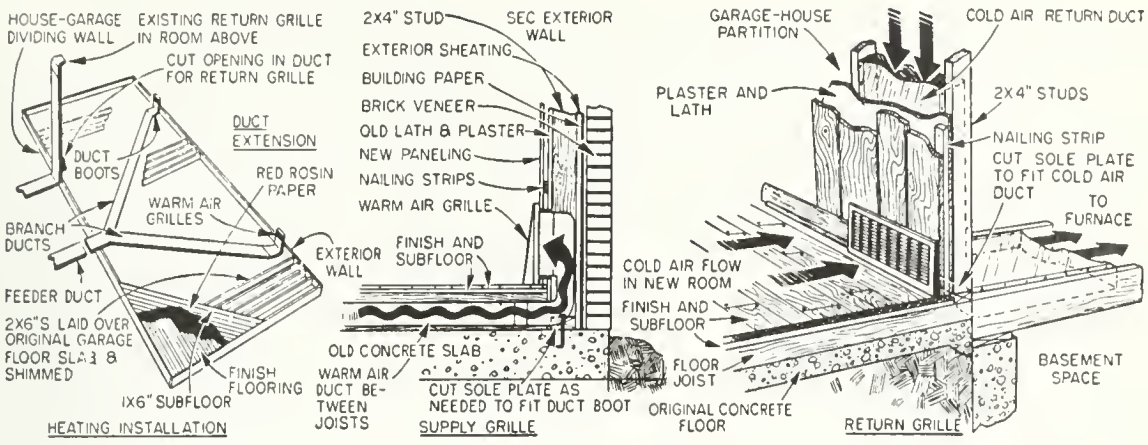
If space limits you to 2 x 2s, 1 x 2s or other small-size screeds which can't bear weight over a span, plane the screeds to varying thicknesses or level off the concrete. The latter course is usually easiest and is required when subflooring, underlayment or tile is laid directly on concrete. Resin bonding agents for such work are made by a number of companies.

First spread a coating of the concrete-to-concrete adhesive over the floor. Then immediately pour a mixture of one part cement to three parts sand, plus water, over the slab to even it. Trowel this grout mixture as you would concrete. If your floor requires a large amount of this mixture, buy it from a ready-mix concrete plant—also the most likely local source of the special adhesive.

If the drop to the concrete floor is less than 1½ inches, a new wood floor surface on it will rise above the house floor; if the



SUBFLOOR VARIATIONS



drop is less than ¾-inch, a beveled strip will compensate for the height variation up to 1½-inch, but beyond that install a stair tread.

When a new wood floor will be level with or higher than the house floor, you can save some money by substituting 1 x 2-inch furring strips spaced at 12-inch intervals, for subflooring—provided the concrete is level.

If you're using tile and the drop to the concrete floor is less than ¾-inch, you can make the floors come out even with thinner underlayment. Plywood, hardboard or particle board of any thickness can be laid directly on concrete above grades, but must be at least ⅝-inch thick when laid over a span.

When garage and house floors are level or the garage floor is higher, lay the tile in mastic spread over the concrete. If this installation is to be below grade (ground surface at point where it touches the building foundation), use asphalt or vinyl-asbestos tiles. Rubber and cork may be used on or above grade; linoleum above grade only.

Heating addition. The existing forced warm air heating system in this home was adequate to include the new room. An opening was cut in the furnace plenum, or heat chamber, for a feeder duct carrying to the wall between house and garage. This was continued to new outlets. Duct boots extended out from the wall about 1¼-inch so grilles were mounted outside the paneling. The cold air return was cut into a return duct, previously installed to serve the room above.

This is modern perimeter (outside wall) heating. A thermostat in the new room regulates the temperature.

When there's no duct room under the floor, you can install warm air outlets along an interior wall and depend on the nearest existing cold air return to create some air circulation. This is not as good an air movement pattern, but gives satisfactory results when laid out by a competent installer.

With hot-water or steam heat, pipes or tubing can be run under the floor or let into the wall. In this case, chopping a channel in the existing plaster would, with furring strips, provide enough space behind new paneling for pipes up to 1½-inch O.D.

If you have an older gravity hot-water system, talk to a dealer or engineer about possibilities of converting it to use modern baseboard radiators or convectors in the room.

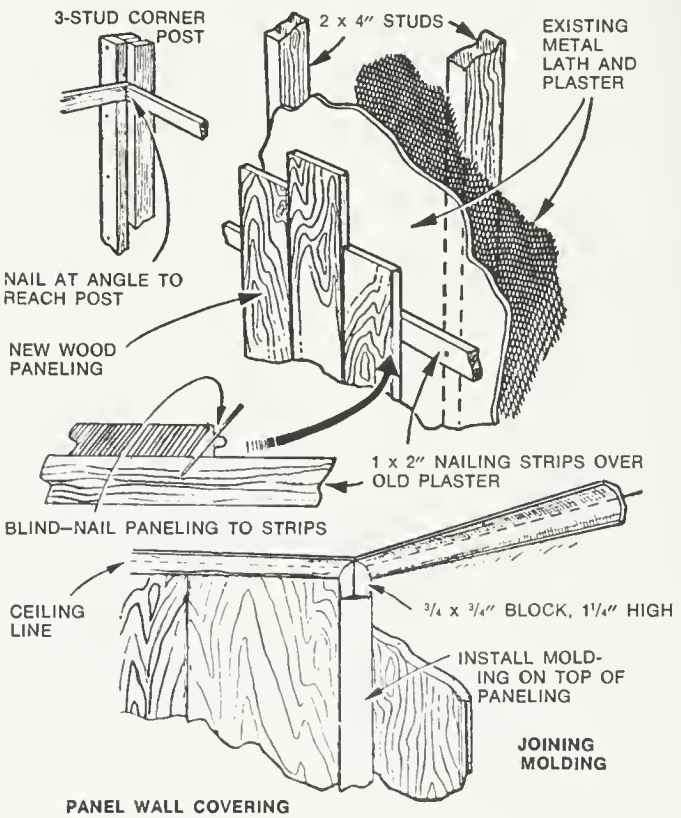
Windows, door frames. If re-installing any doors or windows, merely reverse the removal procedure described earlier. New windows usually come complete with

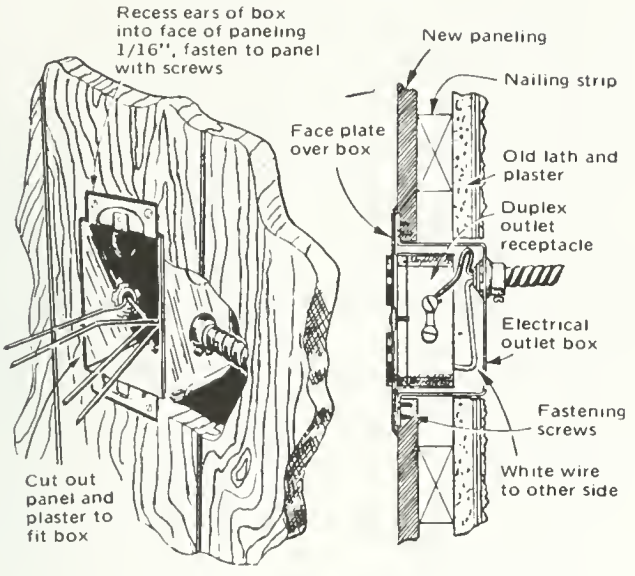
frame. Many may be bought knocked-down at a slight saving. If you do this, be sure to obtain manufacturer's instructions for assembly.

To install a complete, in-the-frame window, tack bracing diagonally across the unit to hold it square while placing and nailing in the opening. Shim the unit to plumb with shingle strips, then nail through the exterior molding into sheathing and wall studs. When installing window in a new rough opening, tack an 8-inch strip of waterproof building paper around opening over the sheathing. Take time to pack insulation in frame-to-rough-opening joint to make it airtight.

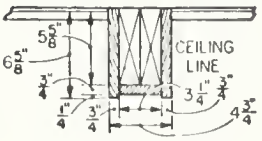
Unless you can buy windows with frames of correct width, fur out each frame so it will be flush with adjoining paneling. You can do this right away by holding a piece of paneling over a furring strip and measuring the distance to frame edge, or you can defer the job until paneling is in place and avoid trouble with high points in the paneling.

To re-install a door frame, it must be similarly furred out—on the edge opposite the door, since door is mounted flush with paneling. It's preferable to build new frames—out of the same wood as the paneling or ¾-inch clear pine. Rip boards to the new wall thickness. Rout the head or top jamb ⅜-inch into side jambs and fasten with 8d box nails. Saw off side jamb extensions above head jamb as required to insert frame in rough opening. Plumb frame with a level, insert ⅜-inch shims (or single strips) on each side and nail through jambs into cripple studs, using 8d finishing nails. Set nails.


3-STUD CORNER POST
2 x 4″ STUDS
EXISTING METAL LATH AND PLASTER
NAIL AT ANGLE TO REACH POST
NEW WOOD PANELING
1 x 2″ NAILING STRIPS OVER OLD PLASTER
BLIND–NAIL PANELING TO STRIPS
CEILING LINE
¾ x ¾″ BLOCK, 1¼″ HIGH
INSTALL MOLDING ON TOP OF PANELING
JOINING MOLDING
PANEL WALL COVERING


Recess ears of box into face of paneling 1/16", fasten to panel with screws
New paneling
Nailing strip
Face plate over box
Old lath and plaster
Duplex outlet receptacle
Electrical outlet box
Fastening screws
White wire to other side
Cut out panel and plaster to fit box

Section through wall



Furring the walls. To prepare for paneling, nail 1 x 2 furring strips over shims where the plaster had already been removed. Also, nail the strips horizontally around the room, directly over the existing plaster and with a maximum 24-inch spacing. Use 10d resin-coated box nails, which will extend into the studs and hold well.

Stop strips flush with the rough framing at openings and butt-join them at corners. If necessary, pre-drill nail holes at an angle and use long nails to reach the corner stud. If plaster is very uneven, shim low spots with shingles. Don't worry about slight unevenness—it will be undetectible after paneling is applied.

Adding to wiring. This one-room electrical installation is quite simple, particularly if you have a spare circuit connection available in your fuse or circuit-breaker box. You need only extend this one circuit to the room and run wiring to the points where you will be installing outlet boxes right after adding the paneling.

If you wish you can attach furring strips at proper height, fasten the boxes to them so that they extend forward about ¾-inch and wire them right away. The plaster wall is cut out as necessary and paneling can be cut when installing the boxes. Cover plates on the boxes will hide the cut-outs.

You could also wire some outlets to the circuit which serviced the area when it was used as a garage. Trace the wiring back to the nearest junction box and start rewiring from there. Run all wiring in between furring strips and hold firmly in place with staples long enough to go through the plaster into studs.

Caution. If you're not familiar with electrical wiring, either call in a licensed electrician or study thoroughly one of the many texts dealing with home wiring procedures. If you elect to handle the work yourself, be sure to abide by your local building code. Most codes require your work to pass professional inspection before granting the approval required by insurance companies.

Apply the paneling. Paneling in this project was prefinished, ¾-inch colonial willow boards. They come in random widths and lengths 100 square feet to the

carton, with both sides and ends having tongue-and-groove edges. The paneling makes up various 8-foot long combinations so, for best results, lay it out on the floor first and try different arrangements for the random effect most pleasing to your eye.

You can start at any corner with the groove side of the first panel against it. Blind-nail through the tongue at an angle with a 5d finishing nail at each furring strip. You need not pre-drill the wood, as it resists splitting well except when very close to an end. Within two feet of the next corner, measure out a combination of panel widths to help you reach it without need for ripping a panel and wasting material.

If you prefer the effect, rip off the bevel on the V-joint when you start the first panel on the next wall. You could nail cove molding in the corners, butting the paneling against it for a different effect than that of plain butt joints. One knotty problem—joining vertical molding to the two pieces of ceiling molding—was solved by installing a small block.

Be sure to panel close enough to door and window jambs for trim to lap at least ½-inch over the paneling.

False ceiling beams. For a rustic touch, run equally-spaced false beams the short way of the ceiling. Non-loadbearing, they were made by encasing two 2 x 6s in willow boards. To do this, chisel holes in the walls at point where beams are to rest, then nail 1 x 4s across the plaster and into wall studs for additional furring under the paneling. When 2 x 6s are in place, attach willow casing with 6d finishing nails and set heads below surface.

Finish flooring. A pre-finished product, comprising alternating oak strips of 2¼ and 3¼-inch widths with factory-inserted walnut pegs at ends, was used for this floor. (Installation is the same as for regular strip flooring.)

Before applying, store finish flooring in the room at least two days to adjust to humidity conditions. At the same time, you can prepare the subflooring by planing down any high spots, setting loose nails and sweeping clean. Lay the first strip at the doorway to match up with existing flooring. If other flooring ends with a tongue, slip the new grooved flooring over it. For joining groove-to-groove, fit a hardwood spline in both grooves. Now measure the width of the doorway. If the first full-length strip ends up about ½-inch from the paneled wall and perfectly parallel with it, you're in luck. If not, rip and re-groove one or more of the doorway pieces as required to compensate for the difference.

Nail through face of first strip in room with 8d flooring nails, spaced approximately a foot apart and close to the groove edge so that base trim will cover them. Also nail this strip and all subsequent strips through the tongue. Start nails where tongue joins the shoulder and drive inward at an angle of about 50° through flower and sub-floor into each floor joist. Also nail each piece within 2 inches of ends, pre-drilling holes to avoid splitting. It doesn't matter if joints don't occur over joists—spiral flooring nails will hold well in subflooring alone.

Fasten each board snugly, but not forcefully, against the previous one. Fit the groove of a piece of scrap flooring over the tongue of warped or stubborn strips to tap them into alignment with a hammer. Finish driving nails with a steel set to avoid hammer marks on the wood. Countersink the heads.

If necessary, rip the last strip to fit in place with just enough room for a thin length of scrap wood between it and the wall. Use scrap as a lever to hold strip snug as you face-nail strip close to edge. The nails will be covered by the base trim, which you are now ready to install, completing the basic garage conversion to your new room.

See also: ADDITIONS, HOME; PANELS; WIRING, ELECTRICAL; WINDOWS.